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THE NATURAL HISTORY OF THE LONG-BILLED MARSH WREN*

BY WILFRED A. WELTER

In recent years there has been a noticeable trend toward the intimate study of various animals. In 1914 Allen (1) published his report on the Red-winged Blackbird and, since that time, numerous other workers have carried on investigations of a similar nature in the field of ornithology. With the appearance of Howard's works (16, 17) new interpretations of bird behavior, previously hinted at, became established, lending impetus to the growing interest in this field of study. The surface has hardly been scratched, however, as each species presents new problems which can be answered only by intensive study.

Much attention has been devoted recently to certain phases of the House Wren's life history and much novel information has been uncovered by various workers in the Baldwin Research Laboratory. Allen (1) has completed a very careful and detailed life history of the Red-winged Blackbird and a parallel study of a breeding associate of this species is considered worth while as environmental factors affecting the species can be better studied. The Long-billed Marsh Wren (*Telmatodytes palustris*) which is very abundant in certain localities affords a wealth of material for a comparable study. This species, due to its secretive habits and its more or less inaccessible habitat, is not particularly well known and many phases of its life history have not been worked out.

Most of the field work was carried on during the year 1931. From the time of arrival in the spring until the birds had departed in the fall some time was spent in the field nearly every day, and from May to September the greater part of each day was thus engaged.

The first brood of *T. p. dissaëptus* was studied in the Renwick Marshes at Ithaca, New York, while the second brood of *T. p. iliacus*[1]

*A portion of a thesis presented to the graduate school of Cornell University for the Ph.D. degree.

The writer wishes to acknowledge his indebtedness to Dr. A. A. Allen for his valuable counsel during the course of this investigation.

was studied at Staples, Minnesota, later in the year. Additional notes were obtained from the Montezuma and North Spencer marshes in the Ithaca region.

The observations recorded in the subsequent pages have been obtained from the intensive study of approximately forty pairs of birds and their nestlings. Many hours were spent in an umbrella blind studying and photographing the birds at close range. During the earlier part of the season much of the time was spent at a slight elevation above the marsh to enable the writer to keep a large number of birds in sight at a given time in order to figure out the limits of the various territories. Each new territory was investigated as often as possible and each newly-built nest was tagged and its position was plotted on a map. Records of the beginning of egg laying, completion of each clutch, and the time of hatching of the young were recorded. Each nestling was marked with a colored thread about its leg to enable identification when the daily weights were taken. Full notes were kept upon the activities of the adults and their offspring so that a fairly complete picture of the life of the species in its summer home has been obtained.

A series of adults and nestlings was collected in order to study growth of feathers, wear, molts, winter and nuptial plumages, and food habits. Skins were also borrowed from several museums to augment the Cornell collection in the study of the eastern subspecies.

Migration

Surprisingly little has been written on the migration of this species. Early and late records are few and in many cases quite misleading due to the fact that marsh habitats are not particularly inviting early in the season. Only a single reference concerning the manner of migration has come to the writer's attention. Eaton (11), in his *Birds of New York*, made the statement that the Marsh Wren migrates at night high in the air. Another indication of night migration was the discovery, by Mr. George B. Saunders, of a skeleton of a member of this species beneath the lighthouse at Cape May Point during the fall of 1931.

The average date of arrival, both at Ithaca, New York, and at Minneapolis, Minnesota, approximates May 10. The variation in time

[1] *T. p. iliacus* is readily distinguishable from *dissaëptus* and should unquestionably be recognized. While almost of the same size as *dissaëptus*, the lighter color of the upper parts and the much brighter cinnamon-buff to cinnamon flanks and sides separate this form. In winter plumage the underparts make a very good distinguishing character as this "foxey" brown is distinctly different from the russet and wood brown of *dissaëptus*.

FIG. 1. The Marsh Wren at its nest. Carrying a dragon-fly to feed young, upper left; female arriving with insect food, upper right; searching for excreta-sac, lower left; excreta-sac in bill, lower right.

of arrival between regions of this latitude and farther south is very slight, due perhaps to a lack of accurate dates for early migrants. The records for time of departure, on the other hand, are less numerous. According to the data obtained from the files at Cornell University and the University of Minnesota, it would seem that the average time of leaving for the latest individuals is between October 15 and 25. A few young birds remain much longer than the vast majority.

During the spring of 1931 daily trips were made to the marsh from April 20 to July 10. A close count of the number of birds and their locations in the marsh was kept each day and, in this way, a knowledge of the order of arrival was obtained. During the period of migration it is easy to locate the various individuals of the species because the growing marsh vegetation projects only a few inches above the water. As a resident male arrives he establishes himself almost immediately in a particular area of the marsh, and in this way the new arrivals are easily distinguished from the earlier birds by their locations.

The first arrivals in the spring are male birds. The migrant males arrive with the residents and may tarry for a day before continuing their northward flight. On May 10 the vanguard of the birds arrived. Five birds were observed on this day; two remained in the marsh while the other three went on. At this time the testes are enlarged to their full extent, as no birds taken later in the season showed greater development. A few more males put in an appearance on May 13, and a large number came in on May 16. Many of these established themselves in the marsh while a few again went on to more northerly locations.

Between May 20 and May 28 the females appeared in the breeding territory. Only a few were observed on the first day but many more came in during the week, so that nearly all the males obtained mates.

On June 4 a few more males took up residence, while on June 16 a very noticeable increase was observed, together with an additional number of females. These birds, together with several stragglers which arrived later in the summer, were perhaps young of the preceding year.

The order of migration might be summarized as follows:

1. Arrival of resident and migrant males.
2. Arrival of resident and migrant females.
3. Arrival of young males.
4. Arrival of young males and females.

There is no marked exodus of birds from the marsh at a given time in the fall. At first the young of the year remain in family groups but, as the time of departure approaches, there is an apparent flocking together of young birds, usually near the water's edge. At this time twenty-five or thirty birds may be observed together feeding near the surface of the water. The next day the numbers may be greatly reduced and in a short time only a few birds remain.

From the birds collected and from observations made at Ithaca, New York, and at Staples, Minnesota, during the fall of 1931, the fall migration might be divided into two sections. The first birds to leave are the adults and some of the young of the first brood. No adult birds were included in the collections made after September 10, and none were observed after this time as a special effort was made to collect any specimen which might prove to be an old bird. The wrens which remain after September 10 are either in juvenile plumage or are in the process of acquiring the winter plumage. These birds were, for the most part, young of the second brood, as the earlier birds had acquired their winter dress by September 1. As these birds complete the molt they, too, depart for their winter homes so that, by October 20, only a few scattered individuals remain. By the first of November these, also, have departed.

There are occasional winter records for the species in this latitude. Whether these stragglers are young or old I am unable to say, but certainly they are only unusual instances and not a part of the normal cycle of the species.

Territory

Since Howard (16) published his "Territory in Bird Life", much information has been obtained on the relationships between a given species of bird and the nesting area. Most birds have been found to live during the reproductive period in a small isolated territory from which all other members of the species are ejected. The Long-billed Marsh Wren is no exception to this rule, showing a very strong attachment to his chosen spot and fighting relentlessly but harmlessly to keep others of his kind from intruding.

Continuous work with a given group of birds enables one to recognize each member as an individual. A variation from the usual song in one instance, a broken tail feather in another, and many other minor variations aid tremendously in following individuals from the time of arrival through the nesting cycle. While it was impossible to mark each individual, the writer was enabled by these minor differences and continuous work with a selected group to distinguish one

bird from another and thus work out the rôle of territory in their lives.

On the day of arrival the male is quiet but is busy moving about over a limited area in the marsh. It is at this time that he actually selects the territory which he will inhabit in raising his first brood. The preferred habitat is not, as one might suppose, a dense tangled mass of dried and broken cat-tails, remnants of the preceding season, but a comparatively open area with a few tattered stalks and an abundance of some species of *Carex*.

He soon forms a rather clear conception of the size of the territory that he wishes to hold, for an intrusion over an imaginary bound-

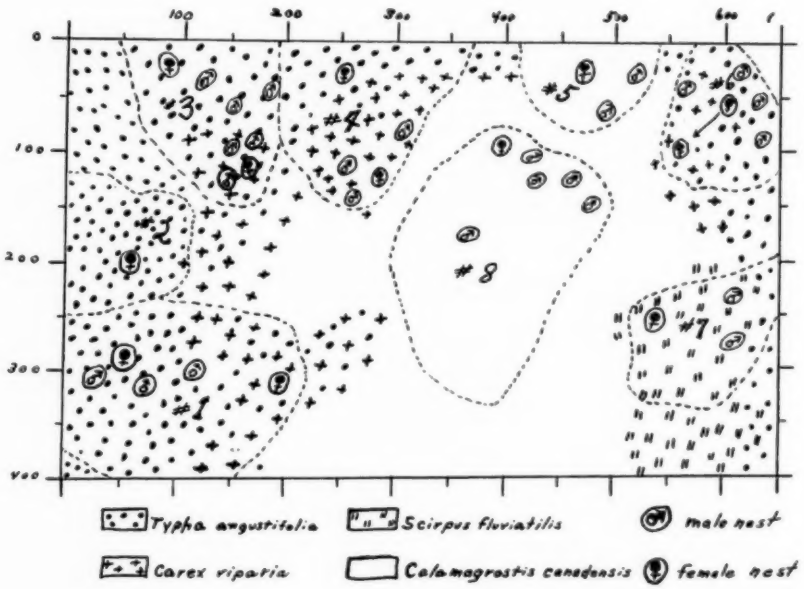

FIG. 2. Map of a portion of Renwick Marsh showing Marsh Wren territories in relation to the dominant plants.

ary by another male is quickly resented and a fight is apt to follow. Fighting over territorial rights between males is, to a large extent, a matter of outbluffing the opponent. A male approaching too closely to the boundary of another's area is challenged by the song of the rightful owner. This is usually sufficient for the intruder, but sometimes the challenge is accepted by the visitor giving voice to his emotions and continuing to transgress upon the area in question. The first male in this case fluffs out his feathers to impress the other and, if

necessary, flies at his opponent. The usurper usually reciprocates by flying at his neighbor a time or two and then, at least in all instances observed, becomes the vanquished and departs from the scene of battle.

On the second day the males are most concerned with holding the area they have selected. It is perhaps on this day that they sing more than at any other time up to the arrival of the females. Several song perches are selected in different parts of the territory and the owner continues to go from one to another singing enroute. If other males are about looking over prospective territories the occupant of a given area will sing almost continually.

The actual territory controlled by a single male is dependent upon several factors. In an area 400 by 650 feet in the Renwick Marsh at the head of Lake Cayuga eight males took up residence in the spring of 1931. The area was bounded on the east and southeast by water. A rather dense growth of cat-tails and sedges covered the north, east, and south sides while marsh grass, *Calamagrostis canadensis*, was the dominant plant in the middle area. The cat-tail-sedge association was greatly preferred to the grass association by the male birds in selecting territories. Allen (1) considered the sedge association the optimum condition for nesting of this species. *Typha angustifolia* is much preferred to *T. latifolia* as a nesting site. This observation is in accord with Saunders (27). The male territories in the favored area were noticeably smaller than in the grassy area. A single monogamous male occupied a territory of from 13,000 to 15,000 square feet, while in the grass association this was extended to approximately 30,000 square feet. The territory of a polygamous male, on the other hand, was considerably larger than that of a monogamous male nesting in the same sort of vegetation. For example, territory number one, occupied by two females, was almost twice as large as number two where one female nested. This difference in size can readily be accounted for by the fact that the female birds do not tolerate each other during the nesting season. As a result those males intent upon leading dual lives must separate the objects of their affection as widely as possible.

The boundaries of a territory, and even entire territories, are sometimes changed after the coming of a female. To illustrate, if a female entered the marsh and tentatively located in an area unclaimed by any male, one or perhaps several males in adjacent territories would immediately try to extend their boundaries to include the

favored spot. Many battles and much singing would follow until one of the birds had established his right to the plot and its tenant. Such performances have been observed even when one of the participants was already satisfactorily mated. Number one succeeded in obtaining the female which became his second mate by annexing some extra territory adjacent to number two even before the latter was mated.

Unusual weather conditions may lead to modifications of original territories. In the spring of 1931 a flood in late May led to many changes in boundaries. Male number two had occupied and successfully defended an area between numbers four and five, and including a part of four as now illustrated. With the coming of the flood his domain did not meet with his wholehearted approval and he moved completely to the new station. Numbers three and four extended their rights to include a portion of the marsh containing a considerable number of erect cat-tails of the previous year.

After incubation is well under way the territory instinct becomes somewhat weakened although the area is defended until the young have left the nest. At this time territorial boundaries no longer remain important as the young, lacking in a knowledge of the limits of the area defended by their parents, go where they will. The feeding instinct is strongly developed at this time so the adults forget the former barriers and follow their offspring and administer to their wants.

The parents usually take up a new territory in a more open area to rear the second brood. Nests at this time are located nearer the water's edge or in areas less given to dense growths of cat-tails. The territorial instinct is redeveloped but it is not as strong then as earlier in the year. After the second brood has left the nest all the birds live together harmoniously until time to depart for their winter homes in the south.

Courtship

When a female wren arrives each male does his best to convince her to settle in his territory. Howard considers display as the chief way of winning a mate but, in the case of the Long-billed Marsh Wren, song is so closely associated with display that both will be considered under this category.

The display of the male is quite simple but interesting. When the female is near he will take his station a foot or two above her, fluff out his breast feathers and under tail coverts, and jauntily cock his tail over his back so that it almost touches. He now resembles a tiny ball of feathers perched among the reeds. As he becomes more animated he beats his partially folded wings up and down rapidly

and sways his head dizzily from side to side. The female probably will fail to notice him, or at least she will not indicate any interest, and, after pursuing her and displaying for several minutes, he will burst into song and fly to another portion of the territory. This same sort of display is often used to impress another male in disputes over territorial rights.

Song does not seem to be as important in attracting the female as display. Of course the song originally attracts the prospective mate into the territory and then display becomes first in importance. When the females begin to arrive from the south the males sing almost constantly. It is then that they sing at night as recorded by Hunt (18). The early morning is the time when the male sings the optimum number of songs per minute. During the period of strife between males contending for desirable sites, the songs average about twenty-five per minute. When the females first arrive this number is again often reached. After the nest is under construction, however, the songs become less numerous and the intervals between singing periods become longer. On May 31, during the period of greatest song for the day, a male sang an average of 6.4 times per minute. The female in this instance had almost completed her nest. On June 5, the songs of this same male had been reduced to less than five per minute. On June 7, a male sang approximately five songs per minute while his mate was incubating and eight songs while she was off the nest. The number of songs per minute becomes less and less as incubation becomes more advanced until the males seldom are heard at mid-day and infrequently in the morning and evening. As the young leave the nest the males sing a bit more often but a week later have ceased almost entirely.

One male bird in an area under investigation was heard singing very energetically after the other males had slowed down to a very few songs. A count on June 12 gave an average of 12.5 songs per minute during the optimum period for the day. A careful investigation of his territory upheld the suspicion that he was unmated. On June 16 he obtained a mate and his behavior now began to agree with that of the others in the colony. It seems possible that his territory, being composed almost entirely of *Calamagrostis canadensis*, *Lythrium salicaria*, and the like, was less desirable and, as a result, he received a mate only after all others were satisfactorily mated.

The song period of the adult birds seems to cease in early August. The writer has never heard one after the first of the month. Bicknell (7) states that the first song period ends in early August. He

reports that several birds were in full song in October and believes that this second period occurs subsequent to their departure. During the course of this investigation no adults were heard to sing after the original song period had come to a close. The young birds, however, begin to sing in late August. At Hayden Lake, Staples, Minnesota, the first song was heard on August 23. A series of singing males was collected throughout the fall and, in all cases, proved to be birds of the year. Jones (20) reported a male singing on November 19. The writer feels quite certain that this must have been a young bird.

The song of the adult male during the breeding season is often associated with a peculiar type of flight. The bird in going from one song perch to another flies along near the tops of the flags, singing enroute. Suddenly he rises six to fifteen feet into the air, and then flutters down upon the reeds. Perhaps this type of behavior is a part of the courtship performance, but the writer is inclined to believe that the altitude obtained enables the bird to check up on would-be intruders, and that this is the real reason for this interesting maneuver.

The male alone has the ability to sing. His song has been described in many ways, as pointed out by Shufeldt (28), but none seems to be quite adequate and most authorities are at variance with one another concerning his vocal powers. It is true that "as a musical composition, it does not rank high," but it certainly reflects the spirit of the singer and adds appreciably to the medley of sounds in the marsh.

The musical behavior of the male is aptly described by Allen (2) who says, "From a tangled mass of brown cat-tails comes a peculiar grinding sound as though someone were gritting his teeth. This is followed by a clicking noise much like an old-fashioned sewing machine, and then out of the flags bursts a little brown ball. Floating upward like a tuft of cotton, it breaks into vivacious music and then drops back into hiding to continue its scolding."

Taverner (29) describes the performance thus: "At a safe distance from the intruder it mounts a tall, solitary stalk to reconnoitre and then launches itself into the air some ten or fifteen feet and gurgles out a rippling melodious little song as it sinks on fluttering wings to another station."

Townsend (30) writes: "The song begins with a scrape like the tuning of a violin followed by a trill which bubbles, gurgles, or rattles, depending no doubt on the skill or mood of the performer; at times liquid and musical, at other times rattling and harsh, but always vigorous. It ends abruptly but is generally followed by a short musi-

cal whistle or a trill, as if the wren were drawing in its breath after its efforts. I have heard one sing fifteen times in a minute. The bird often reminds me of a mechanical musical toy wound up to go off at frequent intervals."

Considering the variety of descriptions and the differences in opinion among the various authorities, one is reluctant to enter still another description of the Long-billed Marsh Wren's song. The whole, however, can be dissected into three parts. The grinding sound mentioned by Allen is given first and may pass unnoticed unless the listener is near the bird. It has somewhat the quality of the call of the White-breasted Nuthatch. It might be described as *aac* or *ac* delivered in a grating manner with the emphasis on the first part. These notes are repeated various numbers of times from one to five. The warble-like part delivered next is no doubt the most musical section. It does remind one of a sewing machine of the older sort being run rapidly, but of course it is less metallic and more musical. It has much of the spontaneity of the House Wren's song but is otherwise quite distinct. This middle section begins at a low pitch, climbs upward, and then descends again. At the end a third section is given, perhaps as an afterthought. It is a trill which may be described as *ee ee ee ee* or *i i i i*. It again is quite low but lacks the harshness of the beginning of the song.

This entire song is given during May and most of June. Toward the end of the month, however, the last part is often omitted and often neither the beginning nor the end is heard.

The songs of the young males which begin in late August are entirely different from those of the adult. Perhaps Langille (22) was listening to young birds when he described the song as "a sharp metallic twitter" as it is certainly more squeaky than that of the adult. The first time the writer listened to a bird of the year trying out his vocal apparatus he was reminded of the efforts of a not altogether successful Catbird. These early songs have the choppy notes of *Dumatella* but are given in a more rasping manner. The grating notes of the beginning and the trill at the end are usually omitted by young birds.

The alarm note has been described by Hoffman (15) as an energetic *tschuk*. During this investigation it was found possible to distinguish sexes by means of the call notes. The *kek kek* or *tschuk* is given by the female. The male's note sometimes resembles this also but can usually be distinguished by its more grating nature and may be described as *rrek*. A series of notes is usually given together so

the *rrek's* do not sound very distinct as they roll into each other producing a chattering. The *kek* notes, however, while also given together, maintain their identity. The female has a hissing sound that she gives if too closely pressed by the male. Preceding copulation the female has been heard to give a trill like that at the end of the male's song.

The call notes of the young are quite similar to those of the adult. The nestling, when the female arrives with food, gives a beady *peep* or *peet*. At first these notes are scarcely audible but as the young become older and stronger the *peet* is clearly heard. As the young leave the nest the *peet* gradually develops into a *queck*. It is much more squeaky than the adult *kek* and also lacks the woody quality. The notes of the juvenal become more and more like those of the adult until they are indistinguishable.

Sexual Relations

The sexual organs of the male are well developed by the time he reaches the nesting marsh following his trip from the southland, but those of the female are not fully developed at her arrival. As a result she is often kept busy avoiding the male during the first week in her new home. If too badly tormented, she will squeeze between the cat-tails at the water's edge where the male can not reach her and hiss at him with the intention of driving him away.

During the period of nest construction she reaches the height of her development and is ready for the mating act. When the male approaches her at this time, singing, she climbs up a cat-tail stalk and gives the trill which has already been described. Then she beats her wings rapidly, points her bill toward the zenith, and places her tail well over her back. The male goes through the courtship display previously described. At the proper time he climbs upon the back of his mate, beats his wings rapidly as the cloacae come in contact and copulation is completed. The whole procedure takes but a few seconds. Both remain in the immediate vicinity for a short time, the male with feathers fluffed out and tail up, the female quiet and demure.

It is usually the male who tries to induce the female into copulation but on one occasion the female was observed going through the behavior leading to the mating act to entice the male. In this instance the act had been completed twenty-five minutes previously. The male, not giving the proper response, was chased by the female among the cat-tails and it is not known whether she was successful or not.

It is the belief of the writer that the male Long-billed Marsh Wren is essentially polygamous while the female is not. Between one-

fourth and one-third of the territories, which were carefully studied in this investigation, were inhabited by two females and one male. In these instances the two females occupied the two ends as far from each other as possible. A probable reason for this apparent lack of sociability, as previously stated, lies in the fact that the females do not get along during the nesting season. On several occasions fights have been witnessed between them. The first one in a territory does not wish to tolerate any newcomers. The polygamous male, on the other hand, is quite diplomatic. Approximately equal portions of his time are spent with his two mates. In this way suspicion is kept at a minimum and neither female is aware of his dual life. The feeding range of the female is rather small during incubation and the rearing of the young so that she never comes into contact with the third member of the triangle.

One doubtful case was investigated where it was thought possible that a single male might have three mates. Owing to the denseness of the vegetation and the fact that nesting was well under way when the area was discovered it was found impossible to ascertain this condition with certainty. Another unusual instance was observed in the same area. Two male wrens were frequently seen in the vicinity of a certain female. Her nest with eggs was located equidistant from the territories of the two males in question. It seems that she had no regular mate as both of the males observed in the area were successfully mated. The nest was later broken up so that it became impossible to complete observations proving the fickleness of the female. It seems reasonably certain that this was a matter of polyandry. It was the only instance of its kind observed and is not common among the members of this species.

Nest Building

As a matter of convenience in the treatment of this section the nesting endeavors of the male and female will be treated separately. The nest used by the female for the rearing of the brood is given the designation *female nest* while the incomplete ones variously known as "false nests", "cock nests", "mock nests", and "dummy nests", will be called *male nests*.

The male nests of the Long-billed Marsh Wren have been a much discussed question in ornithological literature. The earlier writers, not realizing that these were unused, remarked concerning the abundance of nests. Almost any paper dealing with the species has some notes upon this prolific nest-building activity.

Various theories have been advanced to explain the function or purpose of these extra structures. Norris (25) suggests that many nests are built because meadow mice get into them and the wren will not continue to use one if it is disturbed in any way. These dummies have been built for practice, according to Hunter (19), while Allen has suggested that they may be a means of outlining territorial boundaries. Shufeldt (28) says, "I am convinced that these 'mock nests' are built as lures, to induce their enemies to believe that the wrens were not yet laying, or that the eggs had been stolen, so it was not worth while to continue any further search for them." Forbush (12) states that "most of these nests are never used unless the males sleep in them, but their construction gives the birds an outlet for their superabundant energies."

Many of these reasons do not seem to bear investigation. From my own experience the birds do not desert if the nest or contents are handled, for I have visited nests from the first day of construction until the young had left and the adults in no case deserted. The eggs were counted from day to day, the complete clutches were weighed in some instances, and daily weights were taken of the young. Certainly the combination of all these things would have been sufficient to cause desertion if the birds were easily disturbed. The "practice" idea hardly seems reasonable as the male builds the dummies and the female builds the good nest. It may be that the males sometimes sleep in these extra structures but in no case has this been observed. Evening observations indicated that the males went to roost on some reed stalk. Furthermore these nests become so bedraggled in a short time, due to faulty construction, that it would be almost impossible for the birds to enter them. If the territory theory were to be considered, one would expect the nests to roughly outline the boundaries, but this is not the case as often all of the dummies are grouped in one end of the area.

The Long-billed Marsh Wren is not the only member of the *Troglodytidae* that exhibits this peculiar but interesting habit of multiple nest construction, as the European Wren (*Troglodytes troglodytes*), the House Wren (*Troglodytes aedon*), the Short-billed Marsh Wren (*Cistothorus stellaris*), and the Cactus Wren (*Heleodytes brunneicapillus*) also engage in this activity. Other families have representatives that also exhibit the habit, among them the Red-shanks (*Totanus totanus*), the Little Grebe (*Podiceps fluviatilis*), the Florida Gallinule (*Gallinula chloropus*), the Herring Gull (*Larus argentatus*), and the White-throat (*Sylvia communis*). Owing to the wide separa-

tion of these species it can not be that this habit evolved at a single point in avian evolution.

These additional nests are put to some use by certain species of birds. The Cactus Wren repairs the nests as winter approaches (Bailey, 4) and uses them as sleeping quarters. The European Wren also has been known to utilize them during the cold nights of winter. The question naturally arises whether the male nests are not then built for this purpose. This hardly seems possible as these nests are built during the reproductive cycle, usually before the female arrives, in the case of the Long-billed Marsh Wren.

It is not the male bird in all species that is responsible for the additional nests. Howard (17) states that the White-throat female toys with nesting material and actually constructs platforms and shells before she has reached the physiological condition necessary for the completion of a nest. In the same manner many birds have been observed playing with nesting material before they are ready to build.

In the case of the Marsh Wren the male arrives in the nesting territory about ten days in advance of the female. At this time he has already reached his full sexual development and can complete the mating act. He begins to play with cat-tail down and other materials shortly after his arrival. The next stage is the actual construction of a nest shell. Many of these are hardly started before they are abandoned. If these shells had a purpose would they not be completed? Furthermore as the female appears on the scene nest building on the part of the male is tentatively replaced by interest in his mate. The female, on the other hand, has not reached the peak of development and avoids the male at every opportunity. The male then oscillates between carrying materials to the nests he is constructing and paying attention to the female. As the female reaches the stage in which she is ready to build she adds a few straws, in some cases to the nest the male is working on. Later she starts a nest of her own. At first she works slowly and for short periods but a change takes place and all of her time is then devoted to this activity. The male, during this period, loses interest in his work and pays more attention to his mate and shortly ceases building almost entirely.

The question now arises as to the reason for the presence of this activity in certain species when it is entirely absent in others. In the first place the very fact that the two sexes, in the case of the Marsh Wren, reach their full development at different times helps to explain the situation. If the two were to "mature" at the same time would the male still follow the same course of events? This, of course, can

not be answered but, in cases where the male was delayed in obtaining a mate, he built more nests than those birds which were mated earlier. In such instances nest building continued to be substituted for courtship, display, and copulation until a female arrived and reached the stage when mating could be completed.

Now it is logical to assume that male nests should be of common occurrence among a multitude of species as in most cases the male arrives some time ahead of the female. Let us take the case of the Red-winged Blackbird. The males arrive about the middle of March while the females do not appear until the second week in April in the Ithaca region (Allen, 1). Nesting does not begin until some time later. Allen figures a series of testes and ovaries showing their development. It is interesting to note that their maximum development is not reached until the tenth of May and that both sexes mature at the same time. In such cases the male would not find it necessary to substitute nest construction for the sexual relations as both sexes are prepared for these relations at the same time. Even if the two sexes of a given species should not reach the height of their sexual development at the same time the male might not enter into nest building. In different species other substitutes may take the place of this activity. The difficulty of obtaining food early in the season may, in certain instances, cause the birds to devote much of their time to this need. As an example the Red-wing during the latter part of March and the first two weeks in April goes to the uplands to feed and thus spends but a short period of each day in the marsh. Intensive studies of single species may bring many such characteristics to light. Furthermore, all birds are not as highly sexed as others and one would expect nest building and similar activities to be substituted for sexual relations more frequently in those which have an abundance of sexual energy. There can hardly be any question about the wrens as they are notably a group that is highly developed in this direction. Then again the mere difference in nervous energy varies among the species and a slow and comparatively inactive bird would hardly be expected to show the zeal in any endeavor exhibited by a more active species.

The males, in certain forms, continue to build nests even after their mates have begun to incubate. Thus the Marsh Wren may construct several nests during this period but these activities are not pursued with the vigor of the previous period. In like manner the Madagascar Yellow-headed Weaver Bird (*Foudia sakalava*) continues to adorn nests with fresh green materials during the period that his mate is incubating (Rand, MS). If the many nests of the male are de-

pendent upon the slowness of the female in reaching the height of her sexual development, why does this activity continue after her full development? The male continues at the peak sexually for a longer period while the female transfers all of her energy and time to the duties of incubation. This is noticeably the case in polygamy where a male is able to carry on sexual intercourse with a second mate some time after the first female has passed beyond that stage. During this interval, before the decline of sexual desire, the males of certain species continue to transfer their interest to building and as the cycle comes to an end nest construction also ceases. Others transfer their interest to incubation and so sexual intercourse or its substitutes wane. In like manner the males of some species, while not participating in the duties of incubation, spend much of their time on guard about the nest and show much concern over disturbances which might affect their potential offspring and so these duties serve as an outlet for their sexual energy.

Considering multiple nest construction from these angles, then, different species exhibit many modifications of this activity depending upon the factors influencing the reproductive cycle. The maximum development occurs in those species in which the male reaches the sexual peak in advance of the female and maintains this peak for a longer period. Coupled with these physiological conditions is the lack of interest on the part of the male in sharing the domestic duties and guarding the nesting site. The Long-billed Marsh Wren exhibits to a high degree these characters and is perhaps to be considered as one of the most prolific builders of male nests.

In all cases observed the male commences nest construction the day following his arrival at the marsh of his choice. From then on for the next three weeks building is at its height. The average time for completion of a single nest is two days. In many instances several are under construction at one time and often many are never finished. Many of those that are carried to completion are poorly done. Five nests is a fairly good average for a single male bird, during the rearing of the first brood, while several, of course, build as many as ten different nests.

The dummies are built, as previously mentioned, by the male. Sometimes, as the female reaches the nest building stage, she may add a few straws to a dummy on the day or two preceding the beginning of her own nest. She does very little of the work however, and this small part may be considered negligible.

The location of the male nests above the water is variable. Most of the earlier ones are built in the dead cat-tail stubs or among the new growth of sedges and so are between six and twenty-four inches above the water. Later nests, if built in the sedges, are also necessarily low, but, if built in the cat-tails, may be as much as six feet above the water. Most of the dummies are built in the sedges even though cat-tails are available for the purpose.

Because of the fact that the male and female nests are alike up to a certain point the actual description of nest structure will be treated with that of the female.

Between six and fifteen days after her arrival the female bird begins the construction of her nest. The earlier arrivals seem to spend more time before starting than the later ones. These first days are spent searching for food and avoiding the males.

The work on the nest is done almost entirely by the female. In a few cases the male added a little material, usually cat-tail down. It is possible to observe the bird at work if one remains perfectly still at a distance not closer than fifteen feet. The time required varies from five to eight days.

The nest is most often attached to cat-tails but sedges and grasses are sometimes used while Ridgway (26) and Bryant (9) report nests in bushes several feet above the water.

The initial effort in building consists of lashing the supporting plants together and in this way form a cup-like foundation upon which the remainder of the nest rests. *Carex* and *Calamagrostis* are the chief materials used in this part of the structure. The outer walls which are composed for the most part of long strips of cat-tail leaves and stems and leaves of sedges and grasses is the roughest part of the structure. Water-soaked materials, often more than a foot long, are used here as they are more pliable and can be more easily woven together. The first strands are woven around the long axis and others, as the nest assumes shape, are put in at various angles. Some of these strands are fastened to the supporting structure by actually weaving these stems into the nest. Some of the growing leaves are also woven into the outer walls. If the support is a sedge or a grass, leaves may form a good share of the periphery. An opening is left on one side about two-thirds of the distance from the bottom of the nest. At this stage a dummy would be complete. The walls average at least a half inch in thickness and the external measurements of the entire structure approximate seven and five inches for the vertical

and horizontal diameters, respectively. Inner diameters average five and three inches.

This outer shell is a small part of the completed structure, and only two days are required to build it. The remainder of the work is done from the inside and one must take a nest to pieces to get an idea of its arrangement. Grass and sedge leaves and small stems are used to form the second layer. This gives the walls firmness and tends to fill in the large air spaces which are necessarily present among the coarse materials of the outer walls.

The next layer to be added seems to function as an insulating region. Cat-tail down, feathers, small unidentified rootlets, entire

FIG. 3. Longitudinal section through male ("dummy") nest, left, and through female (occupied) nest, right.

plants of *Lemna*, and decayed fragments of *Typha* and *Carex* are the materials most often used. These also are placed into the structure in a wet condition so that, when dry, they form a compact and tight-fitting region which serves as a non-conductor of heat, cold, and moisture.

The innermost region is composed of finely shredded pieces of the vascular materials of the plants forming the outer layers. A large proportion of it is very fine strips of sedges and grasses of the preceding year. Feathers of almost any available sort are used here. Those from the following birds have been identified: Red-winged Blackbird, Virginia Rail, American Bittern, Pheasant, Ruffed Grouse,

and domestic chicken. The projection at the opening is a part of this inner lining. This "door-step" or sill is always present in the female nest but is lacking in the nests of the male. It is possible, therefore, to determine the sex which built a given nest by checking for the presence of this sill. This projection forms the floor of the opening and extends farther into the nest than any other part of the lining. The nest cavity is surprisingly small in relation to the bulky exterior. This cavity roughly resembles a sphere which has been compressed on the sides so that the vertical diameter has been increased at the expense of the horizontal. The opening into the nest, when viewed in longitudinal section, resembles a tunnel. Actual measurements of the cavity, together with external measurements, will be given later.

One wonders what the function of this door-step might be. Perhaps it serves as a protection to the eggs and young as the nest, owing to the uneven growth of the supporting plants, often assumes a distorted position which would allow the contents to roll out were it not for this structure. In like manner when the nests are placed in sedges or grasses winds alter the nests to such an extent that the young or eggs would be endangered if no sill were there to prevent the catastrophe.

Davie (10), Minot (24), Wilson (32), and others also report mud in the lining of nests of *T. palustris*. At no time was this found to be the case during the course of the present investigation. It is possible that a slight amount of mud adhered to the other materials in those instances and this was construed as an active desire on the part of the wren to add such material to the nest.

The outer dimensions are variable but average about seven by five inches. The wall at the widest part, at the door-step, averages about two and one-half inches while the remainder of that side and the bottom are one inch narrower. The back and the top vary from one-half to one inch in thickness. The opening is usually one and one-quarter inches in diameter. The depth from the innermost tip of the step to the bottom of the nest averages two inches while the width of the interior from front to back is also two inches.

Dummy nests are not usually used as a basis for a female nest. In one particular case, however, where a nest was broken up the day preceding the time of hatching, the female appropriated a partially constructed nest which the male had worked on earlier in the season and had abandoned. She completed the nest in four days and on the fifth laid the first egg. This is the only instance of its kind observed and is decidedly out of the ordinary.

Nests, if carelessly attached to growing plants, are sometimes ruined. One was observed that was completely turned over due to uneven growth of two different cat-tails. Those placed in a large expanse of sedges and grasses may be destroyed by heavy winds and rain. Four out of six nests containing eggs or young were demolished during a severe storm. All of those which were attached to cat-tails withstood the attack of the elements and none of the young suffered. It is possible that the mortality from this cause might be very large during certain seasons.

A peculiar nesting relationship was noted by Beard (6), who observed a compound nest, the lower half occupied by a Red-wing and the upper half by a Marsh Wren. Evidently the two species lived together in perfect harmony as both contained clutches of eggs.

Egg Laying

The day following the completion of the nest the first egg is laid, and from then on until the clutch is complete one egg is laid each day. The time of oviposition is from five until eight o'clock in the morning. At Ithaca the first eggs are laid in late May but the largest number of clutches are not completed until the first week in June, and the later arrivals do not begin to lay until June 15 or 20. The egg laying period for the second brood begins in late July. This varies, naturally, with the degree of success in bringing off the first brood. At Ithaca a nest was reported as late as August 7, while at Staples, Minn., most of the clutches were complete by July 25.

Forbush (12) gives the number of eggs as five to ten, usually five. Harlow (14) reporting on 196 nests found numbers from three to seven with five also the average number. Of the forty nests studied during the summer of 1931, five was the most frequent while three and six were the extreme numbers. Aldrich (in a paper read before the A. O. U. at Detroit, 1931) reported six the usual number for the first and five for the second brood.

A series of sixteen eggs in the Cornell collection vary in size from 17.5 mm. by 13 mm. to 13.5 mm. by 10 mm. with an average of 16.5 mm. by 12.5 mm. One of these was a runt egg measuring 13.5 mm. by 10 mm. Two clutches were weighed immediately after the sets were complete. Individual eggs varied from 1.41 g. to 1.56 g. with an average weight of 1.48 g.

Incubation

The female often begins to incubate before the clutch is complete, but waits, in all cases observed by the writer, at least until the third

egg is laid. In most nests young of two and often three ages can be found. In all of the nests under observation the eggs hatched on the thirteenth day. Forbush (12) gives the period as ten to thirteen days. These earlier dates are, perhaps, the result of figuring the period from the completion of the clutch to the time of hatching of the first young. Bowles (8) reports the eggs of the Pacific form, *T. p. paludicola*, under incubation from the time the first is laid. Wheelock (31) gives the period of incubation of this form as twelve days.

The duties of incubation are assumed only by the female. The male seldom comes near the nest and then is driven away by his mate. Wheelock (31) agrees with the present study in finding that the male takes no part in incubation while Miller (23) is in disagreement with this observation.

The female is easily excited during incubation and will leave the nest on the slightest provocation. Even on the very day the young are to hatch she will flush at a distance greater than fifteen feet. She remains near the nest, however, and shows much concern at the disturbance. The male, on the other hand, may be in the vicinity of the disturbance, but shows no interest in the matter.

On the thirteenth day the egg is cut into approximately equal halves by the egg tooth of the hatching bird. This cut is so regular and precise that one must marvel at the mechanical perfection of the operation.

The Young in the Nest

At hatching the young are blind and helpless. The tender flesh-colored skin is partially covered on the capital and spinal tracts by a few pure white neossoptiles. The mouth lining is buff-yellow, the leg flesh-colored, and the skin covering the eye bluish-black. The slit which opens later is clearly discernible at this time.

The type of food delivered to the young by the female is determined to a certain extent by the age of the nestlings. At first this consists of very small juicy morsels such as mosquitoes and their larvae, larval Tipulids, midges, and other delicate forms. The mother brings a whole beakful of food to the nest at one time and parcels it out to the hungry occupants. Contrary to the opinion of Wheelock (31), the young at Ithaca were not fed by regurgitation for the food was not swallowed but crammed along the full length of the tomium. During the first days the young are so small and helpless that it is necessary for the female to reach far into the nest to feed them. During the morning and evening approximately ten trips are made per hour with food, but during mid-day this number is somewhat reduced.

As the nestlings grow the insects brought to the nest become appreciably larger in size. Ground, diving, and long-horned beetles, caterpillars of various assortments, saw-flies and other hymenoptera, and other accessible forms now constitute the diet of the ever-hungry young. Sometimes the insect is so large that the young bird experiences difficulties in swallowing it. In such instances the female takes the hexapod to the side of the nest, chops and tears it into several smaller morsels, and then brings it back for a second trial which is usually a success. In one particular case a medium-sized dragonfly was fed to a ten-day-old nestling. No attempt was made to break the insect into bits and no difficulty seemed to be encountered in swallowing the morsel.

After they have reached the age of eight or nine days, the nestlings stretch for their food so that the female now is not required to reach far into the nest. The nestlings crane their necks to such an extent that the parent often stands on the side of the nest and feeds the open mouths which appear at the opening.

There is much disagreement in the literature concerning the sexes of the parents which attend to the wants of the nestlings. Most writers seem to be of the opinion that the male assists in this duty. No male has been observed, in the nests studied by the writer, bringing food to the nest. This observation is in accord with Wheelock's studies (31). The young can be removed from the nest in the presence of the male without his showing the least concern while the female becomes greatly disturbed if one should approach even the vicinity of the nest.

Even when the nestlings are very young little time, during the day, is given to brooding. Usually after a feeding or two the young are brooded for a few minutes and then feeding is resumed. My records show a total brooding of eighteen minutes per hour when the young are two days old. As the nestlings increase in size the brooding periods become shorter and the intervals between such periods become longer, so that, after the first week, they are discontinued during the hours of daylight.

There is no need of protecting the nestlings from the sun's rays because of the peculiar type of nest construction. It is also possible that such nests aid in holding the heat given off by the birds so that brooding is reduced to a minimum.

The excreta, enclosed in their envelopes, are removed by the female after feeding. These droppings are usually carried some distance from the nest and deposited but occasionally the female has been observed eating them. Only one of these envelopes is removed at a time

and the parent will often hurry up the feeding trips in order to carry away the remaining ones.

When the young are small the faecal material is deposited in the bottom of the nest. As the nestlings increase in size, however, they maneuver about until they assume a position facing away from the entrance, and the dropping is ejected on the periphery of the nest. During the later period of nest life the young succeed in ejecting the excrement with such force that it is carried over the side of the nest and drops to the ground, relieving the female of the necessity of removing it.

Other materials are carried away in a similar manner. Egg shells have been observed twenty-five feet from the nest. Infertile eggs also disappear and it seems that the female must carry them away. No instance has been observed but the infertile eggs have often been found wanting after remaining in the nest several days beyond the normal period of incubation. It is entirely possible that the parent eats these infertile eggs but, if this is the case, they must certainly be removed first as no evidence ever remains at the bottom of the nest. Nestlings which have died from one cause or another are also removed.

The young Marsh Wren, as in the Cowbird in Friedmann's studies (13), soon establishes the power of orientation. When placed upon the back the newly-hatched bird will right itself. At first this is a difficult procedure due to weakness and a lack of co-ordination.

The food response is quickly acquired by the nestling. This response is usually accompanied by a faint *peet* scarcely audible at first. During early life contact seems to be the necessary stimulus but later merely a slight rustling of the leaves as the female approaches the nest is sufficient to cause the young to open wide their mouths and stretch forth their necks.

On the third day the eyes open. With the advent of sight fear begins to develop. At the least sign of danger the young assume a crouching position with the body flat and the neck drawn in. This position was often observed during the periods of weighing and seems to develop at about the fifth day, reaching its height during the second week of nest life.

During the first three days the nestling lies flat on its belly, having no control over the legs, but on the fourth day it assumes a more erect position, placing the weight on the entire tarsus. It has no control over the toes, however, and keeps them doubled up until the ninth day. During this time the wings are an important factor in movement. Shifting about in the nest is a combination of wing and leg

exercises. Grasping with the toes becomes very noticeable on the tenth day and the legs appear well developed at this time.

During the last days of nest life, due to the increased activity of the young, the nest has become considerably worn and no longer has the neat compact appearance of its earlier days. The opening has

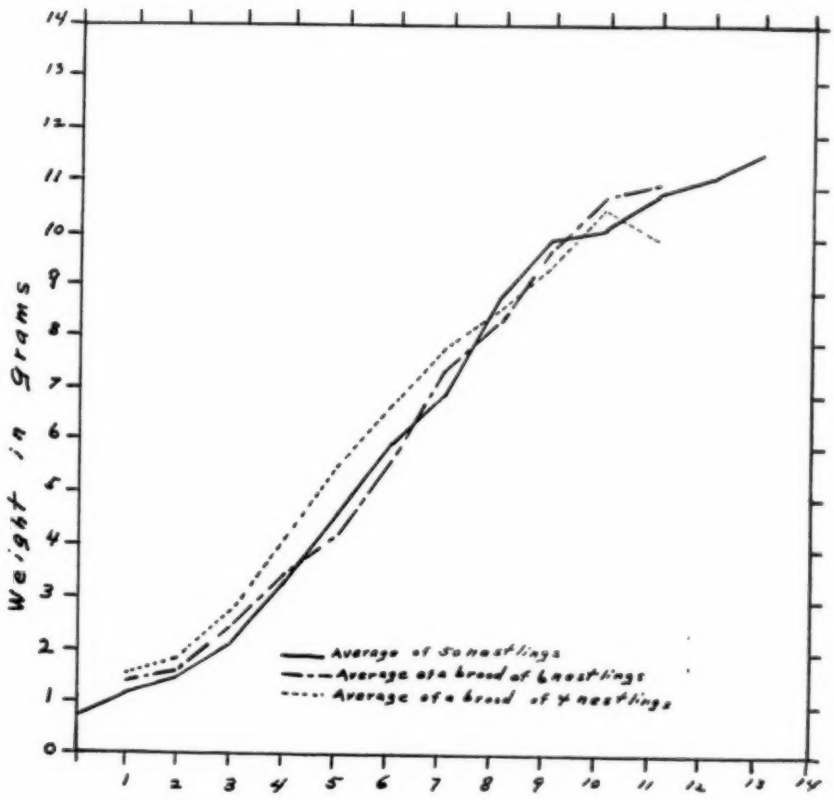

FIG. 4. Graph showing increases in weight of nestlings. Vertical scale shows weight in grams; horizontal scale shows number of days.

become greatly enlarged and the inner diameters have been increased by the young to compensate for their increase in size.

A series of nestlings from thirteen different nests was weighed at a definite time each day to determine the average rate of growth. More weights were obtained during the first seven days of nest life due to the fact that several nests and their contents were destroyed through one agency or another in the subsequent period.

In the first twelve days the young bird increases in weight approximately eleven times. The average weight for the newly arrived wren is .87 of a gram but by the end of the twelfth day this has been increased to an average of 11.08 grams. During this time the gain is from 1 to 1.7 grams a day. Due to the difficulty of being present at the time of hatching very few weights were obtained at that time. During the period of greatest feather growth the gain in weight drops off markedly (10th to 13th days).

In order to check on differences in gain in weight between broods with varying numbers of young, the nests selected for this particular study contained four, five, and six nestlings. No appreciable difference was observed so, no doubt, the females with large broods compensated for the additional members by working harder to supply the necessary food.

When the birds leave the nest they weigh between eleven and twelve grams. This is increased to approximately fourteen grams by the time they are ready to begin the southward journey.

On the twelfth day the young, if frightened or disturbed in any way, will leave the nest. In one particular instance all of the nestlings jumped from the nest and disappeared into the undergrowth at my approach. On the succeeding day, however, one of the birds was found back in the parental shelter. This was the only record of the kind observed but it would lead one to believe that the fledglings may return to the nest to spend the night or to seek protection during inclement weather. They usually spend the night perched upon the flags in the areas of dense rank growth.

The fourteenth day is the normal time of departure for all of the birds studied. At first they run along the ground or hop and half fly from one flag to another. This behavior is no doubt correlated with the fact that the tarsus is much better developed than the wings at this stage. The parents are very solicitous of the welfare of their progeny during this period and an approach to their near vicinity will call forth a series of scolding notes from both adults.

Observations at this season were quite difficult to make, due to the denseness of the vegetation and the fact that the young spend most of their time on or near the ground, and, as a result, are not altogether complete. The parents care for the young for at least two weeks. Wheelock (31) reported the young of the western form, *T. p. paludicola*, to be fed by the parents for twenty-six days. If this is true of *T. p. dissaëptus*, most of the work of the last ten days must be done by the male as the female then starts another brood.

In contrast to the period in the nest, both parents care for the fledglings. The male does little of the work at first but is usually in the near vicinity. At this time he seems to be more interested in the female than in his offspring. Gradually he assumes his share of these duties and toward the end of the second week after the young have left the nest seems to be doing more than his share. After the first ten days out of the nest the young are able to capture some of their food and so cut down to some extent the labors of their parents.

The family group remains together for some time and it is not unusual in mid-September to see four, five, and six birds of an age still keeping together. The young do not remain in the territory of their parents but wander from place to place. At first, as previously stated, they spend most of the time in dense matted and tangled places which offer the most protection. As they develop the power of flight and so no longer need to depend upon secure hiding places, they begin to frequent the more open areas near the water. These areas, usually nearest and farthest from the water, become the localities most favored by the young during the latter part of the summer.

The Second Brood

It is the general consensus of opinion of most writers that there are only two broods per year. It is extremely difficult to get accurate data on this subject but from the material on hand this seems to be the case. It is entirely possible that, with banded birds, more information could be obtained but the difficulty of locating these late nests due to the condition of the vegetation at that time would make the task considerably more complex. No instance which could be considered a third brood was observed by the writer. In some cases very late nests were located but these could be explained by abrupt and unsuccessful terminations to earlier attempts.

The second brood is not necessarily reared in the territory originally occupied by a pair of birds. It is usually the case for the birds to move into a more open area. At this time many of the nests are near the water's edge while for the earlier brood such locations are infrequent.

A new nest is built even though the original territory is used a second time. It is true that the former nest would not be useable because of its worn condition. The male does not enter into dummy nest construction with his former zeal, and in many instances none are constructed. One must not, of course, confuse late arrivals with second broods as the very latest birds often are just beginning to build at the time that the earlier birds are starting the second brood.

The initiation of the second brood naturally depends upon the success of the first. The female begins her second nest about two weeks after the young of the first have left the nest. The majority of the nests, then, in the regions studied would be started between July 15 and August 1, with the last week in July the most active period. Nests with eggs have been found at Ithaca up to August 5.

On the whole the second brood is much more matter-of-fact than the first. The males seldom indulge in song and long before the young are out of the nest they have ceased to sing entirely. By the first of September the adults have fulfilled their responsibilities as parents. As soon as they have completed the post-nuptial molt they begin their southern journey and usually leave the young to follow at a later period.

Food Studies

Because the Marsh Wren is confined to the marshes and swamps and does not come into contact with human habitations and so provide an economic problem, its food habits have not been studied intensively. The most thorough work was done by Beal (5) who examined fifty-three stomachs of this species. He lists the Hemiptera as the group of insects most often preyed upon with the Coleoptera and Lepidoptera second and third. Judd (21) examined five stomachs and reported Coleoptera and Arachnida as the most important foods.

It has not been the intention of the writer to work out the economic status of the species but rather to try to understand and interpret the relationships between food supply and food eaten, and manner of feeding and adaptations and specializations brought about by continued existence in the marsh, in order to determine the effect these things might have upon the survival of the birds in a less moist habitat.

Due to the fact that all of the food is obtained in the marsh, forms which are aquatic for a part or all of their existence constitute a large portion of the diet. Much of the food is obtained near or from the surface of the water. The elongated bill and natural agility of the bird are important adjuncts to this mode of feeding. Feeding operations are also carried on upon the stems and leaves of the cattails and other plants. It is not unusual to observe the bird as he sights a juicy morsel fly into the air and capture it in the manner of a flycatcher. Insects as large as dragonflies are taken in this way.

There is no actual selection of types of insects by the species but the food taken depends upon its predominance and accessibility. By the time the birds arrive in the spring there is an abundance of insect food. Beetles of various sorts form an important part of the diet

during this early period, together with aquatic larvae that have passed the winter in that stage. As the season advances insect food becomes more plentiful and examinations of stomachs reveal a multitude of forms.

Coleoptera and Diptera assume the highest rank while various other orders are represented to a lesser degree. Carabidae and Dytiscidae occur more frequently among the beetles than any other forms while a large percentage of the Diptera belong to the Tipulidae.

With the limited number of stomachs included in the present study it is not possible to state definitely any important features concerning the food taken. Both beneficial and detrimental insects are consumed. It is wholly possible that the Marsh Wren first took up his present habitat because of the abundance of insect food rather than a distinct preference for certain forms that are found there, it is not a matter of kinds of species but numbers of individuals and all seem equally desirable, if obtainable.

Relations of the Marsh Wren to Other Forms of Life

The chief enemies of the Long-billed Marsh Wren are some of the smaller mammals that reside in the marsh. Approximately one-third of the nests containing eggs or young were destroyed in some manner and a very large proportion of this destruction can be attributed to molestation by some form of mammal. No specific case has been observed but the appearance of the nest leads one to this conclusion. Entrance in all cases save one was obtained through the opening at the front of the nest. The structure itself was never torn or ruined in any way. The smallness of the opening and the fact that the nest was not damaged restricts the size of the intruder considerably. It is the writer's opinion that the blame can be placed upon at least one of three mammals: Meadow Mouse (*Microtus pennsylvanicus*), Jumping Mouse (*Zapus hudsonicus*), and Bonaparte's Weasel (*Mustela cicognani*). According to Allen (1) all of these forms occur in numbers in the cat-tail and sedge associations. Meadow Mice were exceedingly abundant throughout the summer of 1931 in the Renwick Marshes.

The Marsh Wrens suffer to a lesser extent from the destruction wrought by other species. Dr. A. A. Allen has observed Bronzed Grackles during the late summer consuming the luckless young of the later nests of the second brood. Other birds are not important from this standpoint; hawks and owls have a poor chance of adding this species to their diet as they are never very conspicuous and can easily hide in the dense vegetation.

Bumble bees have on various occasions used Marsh Wren nests for their own purposes. Whether they ever actually drive out the rightful owner and assume possession I am unable to say. Nevertheless it is apparently not unusual to find a colony of these bees in a nest of this species as Dr. Allen has several cases on record.

The parasites recorded for this species are few. Dr. Eloise B. Cram kindly supplied records of the flea, *Ceratophyllus garei*, and the louse, *Philopterus mirinotatus mirinotatus*. Hippoboscid flies, evidently *Ornithomia avicularia*, have been observed several times but at no time was it possible to obtain specimens. The alimentary tracts of more than fifty birds were examined carefully without obtaining a single cestode or nematode.

The Long-billed Marsh Wren usually lives in harmony with its associates in the marsh. It practices to some extent the habit of puncturing the eggs of other birds in a manner similar to that of the House Wren. Allen (1) describes this practice in detail and gives the Marsh Wren the blame for breaking up fourteen out of fifty-one nests of the Red-winged Blackbird. From these records one would be led to believe that the habit is very common and that the percentage of prospective birds destroyed in this way is large. It is the opinion of the writer that these instances concern only a few of the birds and that the great majority do not enter into this pernicious practice. Many nests of other species of birds were under observation in the marsh and at no time were punctured eggs found or other indications of egg eating by the Marsh Wren observed.

Discussion

Undoubtedly the Marsh Wren took up its present habitat a long time ago as denoted by its degree of specialization. Allen (1) considers the Redwing a comparatively recent addition to the avifauna of the marsh. Following his method of reasoning the Marsh Wren must have taken up its present residence at a much earlier period as indicated by certain factors. In the first place the species has become specialized as regards the elongation of the bill and the tendency toward reduction in use of the wings. At present the Marsh Wren is a relatively poor flyer with the female seldom taking wing. A continuation of life in the present habitat will most assuredly lead to further reduction of this ability. Secondly, all of its time is spent in a marsh environment. The Redwing takes up residence in this situation only long enough to bring about perpetuation of the species. Thirdly, it does not revert easily to dry land when conditions in the marsh be-

come unfavorable, even though the southern forms occasionally nest in bushes. At Ithaca a colony was located nesting in a dry marsh grown up to sedges and grasses. Of the four nests observed in this region all came to an untimely end due to the heaviness of the nest in proportion to the supporting plants. The nests were so badly mangled by a wind-storm that eggs and young fell to the ground. Nests in cat-tails during the same period easily withstood the onslaught of the storm. Nests constructed in the cat-tails have a much greater chance of success than others indicating that the birds, being most accustomed to this type of supporting plant have been marsh residents for a long period. Lastly, the Marsh Wren, unlike the Redwing, seeks shelter in the marsh rather than depending upon flight for safety.

Perhaps originally the Marsh Wren took to the marsh because of the abundance of food, lack of competition in this less favored environment, and the shelter afforded. Owing to continued existence in this habitat specializations of various sorts have developed making it almost mandatory for the species to continue its present mode of living. Were the species to gradually change its habitat to the more extensive but less moist meadows and semi-dry marshes of grasses and sedges the most necessary change, in my opinion, would be a less bulky nest placed lower on the supporting plants. The Short-billed Marsh Wren has adapted itself to this type of environment and its nesting activities are attended with success.

As the marshes become less extensive the Long-bills will find it necessary to adapt themselves to a life in a dryer situation. This change will come about gradually as certain members are forced to nest farther and farther from the center of the colony. These birds, in order to survive, must adapt their nest structure to the nature of the supporting plant and in this way bring about a gradual evolution which will permit the species to continue to exist even when marshes are no longer present. At the present time some of the nests around the border of the colony are somewhat modified due to the nature of the flora in which the birds find it necessary to build.

The Marsh Wren, while unequivocably a specialized species, is sufficiently adaptable to meet changing conditions and will, as necessity demands, gradually assume a place in an environment consisting of associations of grasses and sedges. It is a specialized species but not so specialized that it cannot live apart from its present habitat.

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A STUDY OF THE SAVANNAH SPARROW IN WEST VIRGINIA

BY THOS. E. SHIELDS

To me, the Savannah Sparrow (*Passerculus sandwichensis* subsp.) has been an interesting bjrd ever since I became familiar with it. That was one reason why I chose (1) to make a study of this species in 1934. The other reason was that, prior to 1934, there were no nesting records of the Savannah Sparrow for West Virginia, and I hoped to find a nest of this species.

Until June, 1931, we did not know that this species was a summer resident in the West Virginia Panhandle, which includes Hancock, Brooke, Ohio, and Marshall Counties. In the last week of that month, Sarah Hine saw a strange bird at Oglebay Park, Ohio County. Reinhold Fricke of the Carnegie Museum, was at Oglebay at the time, so he visited the spot where the bird had been seen, and found both a male and a female Savannah Sparrow. Fricke collected the female (2) which proved to be an Eastern Savannah Sparrow (*Passerculus sandwichensis savanna*). Examination showed the bird had been brooding.

During the summer of 1932, this species was listed occasionally at Oglebay. In the summer of 1933, it was listed more frequently. I found at least two different males singing in separate parts of the Park, during this period.

In January, 1933, Dr. Sutton's annotated list (3) of birds of the West Virginia Panhandle, was published. He showed the Savannah Sparrow as "decidedly rare and local as a summer resident," giving no nesting records. Sutton also pointed out that the Panhandle contains Transition Life Zone birds, as well as Upper Austral Life Zone birds. Since Dr. Chapman (4) showed the Eastern Savannah Sparrow as breeding in the Canadian and Transition Life ones, we might expect to find it breeding in the West Virginia Panhandle.

All of these things led me to believe that the Savannah Sparrow nests in this locality, so in May, 1934, I started to look for a nest of this species.

I was not successful until May 26, when, in a field at Oglebay Park, Ohio County, I flushed a female Savannah Sparrow from its nest, when I was but five feet away. I immediately discovered the nest, the first to be recorded in the state of West Virginia. It contained five eggs.

This record was published in the June, 1934, issue of the *Redstart* (5)-(6), the July, 1934, *West Virginia Nature News* (7), and in the December, 1934, issue of the WILSON BULLETIN (8).

A. B. Brooks, Oglebay Park Naturalist, made several photographs of the nest on May 27.

While visiting this nest, I found another pair of Savannah Sparrows in a field adjacent to the one in which I found the nest. I tried several times to find the nest of these birds, and on June 12 I was rewarded for my efforts. This nest contained two young birds and one sterile egg. When I returned to the nest on June 13, the young had flown, so no photographs of this nest were made.

The balance of this paper is devoted to the information gathered in my study of this bird. I am indebted to my associates in the Brooks Bird Club for some of this information. These associates, whose names appear in this article, are Sarah Hine, A. B. Brooks, Lloyd Poland, Russell West, Charles Conrad, Clyde Upton, and James Handlan.

To my knowledge, the Savannah Sparrow does not occur in West Virginia in winter. At least, I have not been able to find any winter records of this species for West Virginia. I am quite sure that it does not winter in the Panhandle, because neither Dr. Sutton nor the members of the Brooks Bird Club have listed it during that season, and they cover a goodly portion of the Panhandle.

This bird reaches the Panhandle in its spring migration around the last of March or the first of April. The local migration records of this species are rather incomplete, since they cover only 1933 and 1934, but I believe they are approximately correct. In 1933, this species was first listed on March 28, while in 1934, it was not listed until April 7 (9). The earliest migration record for each spring was made near water. In 1933, Russell West found this bird at Beech Bottom Swamp, Brooke County, for the first record, while Charles Conrad and George Flouer made the first 1934 record at the same place. This indicates that the species migrates in spring along or near bodies of water. I recall distinctly that in 1933 and 1934, we did not find a Savannah Sparrow in its summer habitat at Oglebay Park, which is some distance from any bodies of water, until several weeks after the bird was seen at Beech Bottom Swamp, even though we were constantly watching for this species at Oglebay. At the Wheeling Country Club golf course, which has small bodies of water scattered over it, this bird was listed on April 8, 1934, one day after it was recorded at Beech Bottom Swamp.

Apparently the Savannah Sparrow is a spring migrant in scattered parts of West Virginia. It certainly occurs in migration at Terra Alta in Preston County, where it is a summer resident. I was at this

place for two weeks in the summer of 1933 and found several pairs there. Bibbee (10) states he has found this species in spring migration in Wood County. The Panhandle, Preston County, and Wood County are all some distance apart from one another.

In West Virginia, the summer habitat of the Savannah Sparrow is in large upland fields and in large fields bordering bodies of water, at elevations of approximately 1175 feet or more. The seven places in Ohio County where this bird is known to reside during its breeding

FIG. 5. Nest of the Savannah Sparrow, Oglebay Park, Ohio County, W. Va., May 27, 1934. Photographed by A. B. Brooks.

season all come under the classification of large upland fields. However, at Terra Alta, I found this species in large fields by Lake Terra Alta as well as in upland fields some distance from the lake. As to elevation, the fields at Oglebay Park where I found the Savannah Sparrows nesting, are approximately 1250 feet high. Another field at Oglebay, where I found a pair of these birds, has the same elevation. The field at Oglebay where this species was recorded in 1931, 1932, and 1933, and where I finally found it in 1934, has an elevation of about 1175 feet. At Carter's farm, a short distance from Oglebay, I found the bird at an elevation of 1300 feet. Clyde Upton reported Savannah Sparrows at the Wheeling Country Club golf course in the summer of 1934. This place is adjacent to Oglebay and the elevation there is about 1175 feet. Charles Conrad reported this species at Romine's Farm, a few miles from Oglebay, during the same period

and I believe this farm is approximately 1200 feet high. At Fawcett's farm about five miles from Oglebay, A. B. Brooks found a Savannah Sparrow in the summer of 1933. This farm is the highest in Ohio County, the elevation there being 1385 feet. The points I have referred to are all rather high for this region, the average elevation for Ohio County being about 700 feet, I believe. At Terra Alta, West Virginia, where the elevation is close to 3000 feet, I found several pairs of these birds in the summer of 1933.

The Savannah Sparrows in the West Virginia Panhandle must begin nesting during the latter part of May. I found a nest on May 26, when the complete set of five eggs was in it; and another on June 12, when the young were almost ready to leave the nest. Forbush (11) gives May 21 to June 29 as nesting dates for this species in Massachusetts, while Chapman (4) gives May 19 as the nesting date for Utica, New York.

The two nests which I found were slightly different in construction. They were both in small cup-like depressions in the ground, but the first was more cleverly concealed than the second. The first nest was at the foot of a stalk of grass, and did not protrude above the ground. It was made of a few fine grasses, very neatly placed in a cup-like hole in the ground. The second nest was bulkier, protruding slightly above the ground. It was made of coarse grasses lined with finer grasses. The two nests were at the same elevation, and were separated by a road. The distance between them was about 150 yards.

There are not enough data available to say how many eggs the Savannah Sparrows in this region lay. One nest I found contained five eggs, while the other nest must have had three eggs in it, since there were two young birds and one sterile egg in it when I found the nest. Reed (12) and Roberts (13) show this species as laying three to five eggs, and my records check with these figures. However, some other authors give slightly different figures.

The eggs of this species are ovate in shape. It cannot be said that the eggs are one particular color, because of their variation. The many authorities on bird eggs give quite different descriptions of the color of Savannah Sparrow eggs. The eggs in the first nest were all I had to observe, since the sterile egg in the other nest was covered with excreta. However, of the five eggs in the one nest, four of them were very pale brown with cinnamon-brown spots about the larger end. The other egg had a bluish tinge, while the spots on it were cinnamon and more pronounced. It may be of interest to note that the one egg which was colored more brilliantly than the others was

the only fertile egg in the nest. I can find no information to the effect that fertile eggs differ from infertile eggs in color, but that was certainly true in this instance, although it may have been only an accident.

The fact that the two nests contained five infertile eggs and three fertile ones, is very interesting. It is known that birds on the edge of their breeding range lay a high percentage of infertile eggs. The fact that the nests I found contained a large number of infertile eggs, may indicate that the West Virginia Panhandle is on the edge of the breeding range of the Savannah Sparrow, and, since this range lies to the north, the Panhandle would be on the southern edge. Allen (14) explains that birds on the edge of their breeding range, are not so likely to be in mating rhythm as those toward the center of their breeding range; and, as a result, the birds on the edge of their breeding range are less likely to produce fertile eggs. There must be some reason for such a high percentage of infertile eggs (62.5 per cent), and Allen's explanation seems plausible.

My nesting records extend the breeding range of this species approximately forty-five miles southward along the Ohio River in this district. Formerly, there were no nesting records below Columbiana County, Ohio, in the Upper Ohio Valley.

I regret to say that I do not have any data on the rearing of the young of the Savannah Sparrow. I watched the first nest for three weeks waiting for the eggs to hatch, but they didn't hatch. Since, according to Roberts (13), the incubation period for this species is twelve days, I felt sure the eggs would not hatch after twenty-one days, so I collected the nest after that much time had elapsed. There was only one egg which was not cracked by that time, so I broke it and found a partially developed young bird in it. Apparently the adult birds had allowed this egg to cool after the embryo had developed to a certain extent. Of the seventeen days in which I visited this nest, I found one of the birds on it nine times. The adult was on the nest as late as June 12, or seventeen days from the time of my finding the nest.

The other nest was not found until the day before the young left it, so, I had no opportunity to observe how these young birds were raised. The best I could do was to make notes on the pluumage of the juvenile birds.

Although I cannot say definitely, since the male and female Savannah Sparrows have practically the same appearance, I believe the female did all of the incubating in the first nest. At least, when

I was able to distinguish between the two adults. I found that the female was or had been on the nest.

The two juvenile Savannah Sparrows which I observed, were a mixture of brown and yellow. The base of the bill was bright yellow, and the underparts were yellow with brown streakings. These streaks were not as prominent as those on adult birds of this species. The back was mostly brown, with some yellow parts. There was just a suggestion of the yellow streak over the eye. Altogether the young birds were much brighter in color than the adults.

In studying the habits of this species, some interesting things came to light. One of the first things to impress me was the action of the female bird when I approached its nest. It would allow me to come as close as five feet from the nest, before it would leave it. Then the bird would hop from the nest and drag its wings, pretending to be wounded. After it was about twenty-five feet away, it would run through the grass like a field mouse. While this was going on, the male would keep chirping insistently, scarcely pausing at all. The female chirped only occasionally and even then not so loudly as the male.

The Savannah Sparrows in this region are very scary. I could not get closer than fifteen feet to any of them, except when one was on the nest or when young were in the nest. Blanchan (15) says this bird, in the north, loses the shyness which makes it so little known in the southern part of its range. It certainly is very shy in this section, and the same is true of this species at Terra Alta.

When the Savannah Sparrow is flushed from the nest, and the observer retires to a spot about fifteen yards away, the male bird chirps constantly, attracting as much attention as possible. If the observer keeps his distance for a while, the female will gradually work her way back to the nest, crawling through the grass for some distance, while her mate continues chirping. I saw this done a number of times and the routine never varied, except when the bird was so frightened that it would not return to the nest for a long while.

If this bird knows you are watching it, it will peek at you from some bush, with only its head and neck visible. It will twist its head around to get a better look at you, but will keep fairly well hidden. This habit helps in identifying the bird.

On several occasions, I noticed the adult Savannah Sparrows giving a harsh "*bss*" when I was at their nest. This was a new note to me, and upon referring to various authorities, I found only Forbush (11) recorded this utterance. He said the birds give this note

when two of them are quarreling, but I think otherwise. One bird will give this note when its mate is not near, so it could hardly be called a quarreling note. I am sure it is an alarm note, since I heard it only when I was very near the nest.

The ordinary chirp of this species is a sharp "*tsip*". Its song is generally recorded with three introductory notes, but the birds in this region almost always give four introductory notes in their song. Sometimes the observer does not hear one or two of these first notes, if he is not close to the singing bird. I find only Eaton (16) shows that this species gives three or four beginning notes in its song.

While the Savannah Sparrow is essentially a bird of the fields, it is sometimes found in small trees, bushes, and on fence posts. This bird has a number of favorite perching places, and there the male sings frequently. Only twice did I ever hear a Savannah Sparrow sing from the ground, once at Oglebay and once at Terra Alta.

Apparently the Savannah Sparrows in West Virginia nest here only once a year. On July 14 and July 21, 1934, I visited four stations in Ohio County and could not find a single Savannah Sparrow. I am sure I would have seen one had any been there, for I knew a number of their favorite perches. James Handlan, who spent most of the months of July and August, 1934, at Terra Alta tells me he did not list a Savannah Sparrow there after July 20. This indicates that the birds move to another region after their first nesting period is ended.

In concluding this paper, I would like to call attention to several things which I consider important. First, that the Savannah Sparrow does nest in West Virginia. Then, that the West Virginia Panhandle may be on the southern edge of the breeding range of this species. Also, that my nesting records extend the breeding range about forty-five miles southward in the Upper Ohio Valley. Another thing worth considering is that this bird may be extending its range southward. Either this is the case, or we are finding the bird more because we have become more familiar with it. Campbell (17) found similar circumstances in Ohio and he thought it likely the Savannah Sparrow was extending its range southward. I am not so sure that this is the case in the Panhandle. Almost all of the present stations in Ohio County are fields that have not been covered previously to any extent by ornithologists, and it is possible we may have overlooked this species.

It might also be well to consider the fact that the Savannah Sparrow requires an elevation of 1175 feet or more in this region.

Christy (18) found this species in Western Pennsylvania only at an elevation of 1200 feet. I am sure that elevation plays a large part in the Savannah Sparrow's selection of breeding sites, as there are numerous fields in this region which would be suitable for this species, were it not that they are too low.

I consider the alarm note of the Savannah Sparrow an important discovery, as is the song which I have recorded different from previous descriptions of this bird's song.

Finally, this species is no longer "rare as a summer resident" in the West Virginia Panhandle. I would call it uncommon in this region, and I would say that it is still local, since all of the summer stations of this bird in the Panhandle are within a radius of five miles.

As to its status in the state of West Virginia, I think Brooks' classification of "decidedly rare" (19) should be changed to "rather rare and local in distribution".

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NOTES ON THE RENAL BLOOD-VESSELS OF RAPTORIAL BIRDS

BY F. L. FITZPATRICK

As has been noted in a previous paper, text-book descriptions of bird kidneys usually refer to the kidneys of the chicken or the pigeon. Usually these are illustrated as being composed of three more or less equal lobes.

In the case of Cooper's Hawk the anterior lobe is much larger than either the middle or the posterior (caudal) lobe. The anterior and middle lobes are continuous, but the posterior lobe is separate. On each side of the body the ureter appears on the ventral surface of the middle lobe (kidney), proceeds along the ventral surface of the posterior lobe, and thence posteriorly, where both oviducts open separately into the urodaeum.

With slight variations this appears to be substantially the same situation that is found in the Eastern Red-tailed Hawk, the Barred Owl, and the Great Horned Owl.

However, in the Turkey Vulture the situation is somewhat different. The anterior lobe of the kidney is large as in the preceding cases, but the remainder of each kidney is partially divided by constrictions into what appear to be three lobes, and the ureter emerges at the posterior end of the kidney.

In the case of the male Eastern Red-tailed Hawk (*Buteo b. borealis*) the main circulatory connections of the pelvic region proved to be as illustrated in the accompanying diagram.[1] The dorsal aorta passes between and dorsal to the kidneys in the midline. Two renal arteries enter the anterior lobes of the kidneys. Farther posteriorly two femoral arteries are given off which pass dorsal to the middle lobes of the kidneys, give off a branch in each case to the dorsal body wall, and extend laterally to the body wall, where they branch to the body wall and the region of the hind limbs. Although these arteries are figured as giving off renal arteries to the middle and posterior lobes of the kidneys (pigeon) in some text-books, this did not appear to be the case in hawks of the genus *Buteo*. Then the dorsal aorta gives off a pair of sciatic arteries which pass laterally, and dorsal to the posterior lobes of the kidneys.

As will be seen in Figure 6, a large iliac vein crosses the ventral surface of each kidney between the anterior and the middle lobe. Short branches from the anterior lobe connect with this vein in *Buteo l. lineatus* and presumably in *Buteo b. borealis* as well. The two iliac

[1]Terminology as given by Parker.

veins unite in the midline to form a large postcaval vein, which of course is ventral to the dorsal aorta in position.

It will be noted that each iliac vein receives three main branches, one of which is a renal vein from the posterior lobe of the kidney. The second is an extension of the so-called "renal portal vein", which according to Parker gives off only a few minor afferent renal vessels in passing through this lobe.[2] This renal portal vein discharges into the femoral vein just distal to the point where the latter vessel joins

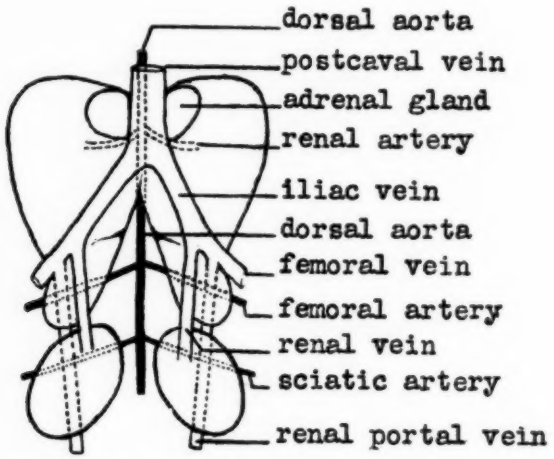

FIG. 6. Diagram of the renal blood-vessels in a Red-tailed Hawk.

the renal vein to form the iliac vein. The third is the femoral vein. It is with respect to these branches that variation among different species is most evident. Finally, two veins which are figured as "renal portal veins" in some text-books extend to the posterior lobes of the kidneys from the posterior end of the body.

The foregoing description of the larger blood vessels associated with the urinogenital organs appears to be more or less typical of the North American hawks and owls mentioned in the foregoing discussion, although it is subject to some variation among the species studied, and no doubt to somewhat less individual variation as well.

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[2]Note: These branches might be efferent renal veins in this case. Parker's work refers to the pigeon.

ROBERT HENRY WOLCOTT

BY MYRON H. SWENK

Dr. Robert Henry Wolcott was born at Alton, Illinois, on October 11, 1868. His father was Robert N. Wolcott and his mother Agnes (Swain) Wolcott. It was in the neighborhood of Grand Rapids, Michigan, however, that as a boy Wolcott pursued his earliest interests in biology. His first publication, dealing with bird observations in the vicinity of Grand Rapids, was published in the *Ornithologist and Oölogist* in 1884, when he was a sixteen-year-old student in the Grand Rapids High School, from which he graduated in 1885. Soon after this graduation young Wolcott entered the University of Michigan at Ann Arbor, where he received the Bachelor of Law degree in 1890, the Bachelor of Science degree in 1892, and the degree of Doctor of Medicine in 1893. As a young man in the University, Wolcott found numerous opportunities for biological field work in the vicinity of Ann Arbor. During these years he associated considerably with that group of Michigan bird students that organized the Michigan Ornithological Club in 1895. After the organization of this club, Dr. Wolcott contributed articles, dealing with the nesting of different species of Michigan birds, to the *Bulletin of the Michigan Ornithological Club*.

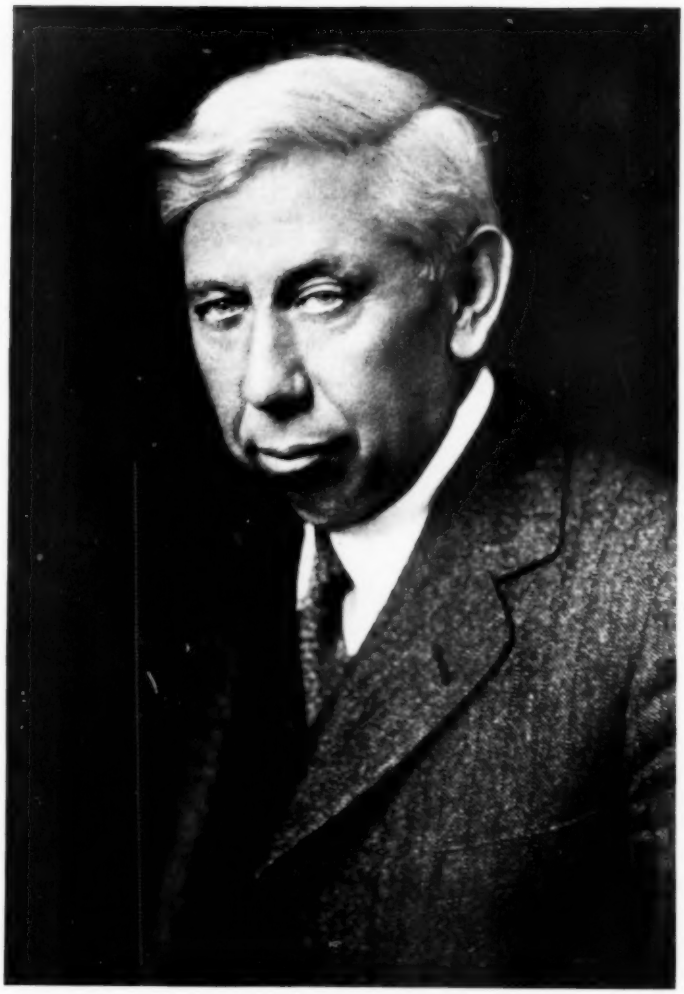
Instead of engaging in the practice of law or medicine, upon the receipt of his B. L. and M. D. degrees from the University of Michigan, Dr. Wolcott engaged as a member of a party making a biological survey of the waters of the state of Michigan, with special reference to the fish supply, during the summer of 1893. He continued this work during the summer of 1894, in which year he received a call to continue graduate study and act as an assistant in the Department of Zoology at the University of Nebraska, which appointment he accepted. His work in Nebraska ornithology began, therefore, in the fall of 1894, and continued over a period of forty years until his death at Lincoln on January 23, 1934. On June 2, 1897, Dr. Wolcott was married to Miss Clara Buckstaff of Lincoln, who, with a brother, son, and daughter, survives him.

Four years after his removal from Michigan to Nebraska, in 1899, while Dr. Wolcott was holding the position of Adjunct Professor in the Department of Zoology, and with the successful organization of the Michigan Ornithological Club fresh in mind, he coöperated with Professor Lawrence Bruner, then Chairman of the Department of Entomology and Ornithology at the University, in the organization of a Nebraska Ornithological Club at Lincoln. It so happened that at almost exactly the same time, but quite independently, there was also a

Nebraska Ornithologists' Association organized at Omaha. A combination of these two organizations in the summer of 1899 resulted in the establishment of the Nebraska Ornithologists' Union, which held its first annual meeting at Lincoln on the following December 16. Dr. Wolcott was the first Recording Secretary of the new state organization. He retained that office by successive re-elections during the years 1900-01 to 1903-04, and the first three volumes of the *Proceedings of the Nebraska Ornithologists' Union* were brought out under his editorship in 1900, 1901, and 1902, respectively. At the close of his fifth year as Secretary, Dr. Wolcott retired from that office in order to accept the office of President of the organization, on January 30, 1904. Subsequently he was three times re-elected to this office, in 1916, 1923, and 1924.

Dr. Wolcott's first papers on Nebraska birds included one published in the *Bulletin of the Michigan Ornithological Club* in 1899, dealing with birds noted in Nebraska in the fall and winter of 1898-99, and others in the *Proceedings of the Nebraska Ornithologists' Union* in the years immediately following the establishment of the latter organization. In 1899, Dr. Wolcott returned to Grand Rapids for a summer of field work, varied with a month spent in similar work at Batavia, Illinois. In 1900, he spent the early summer in the field at Woods Hole, Massachusetts, and August of that year at Indiantown Island, Maine. During these two summers a great portion of his attention was devoted to the birds, as extensive ornithological notes during this period from the several localities just mentioned testify.

The year after his arrival in Nebraska, Dr. Wolcott was made an instructor in the Department of Zoology at the University of Nebraska, and received the degree of Master of Arts at that institution. Three years later (1898) he was promoted to be Adjunct Professor of Zoology. In 1902, he became Assistant Professor of Zoology and Demonstrator in Anatomy, and the following year was again promoted, to be Associate Professor of Zoology, in charge of the Anatomy Laboratory. Two years later (1905) he was given the rank of a full professor, with the title of Professor of Anatomy. It was he, largely, who developed the pre-medical work in the University of Nebraska, then under the administration of the Zoology Department. In 1909, Dr. Wolcott was made Chairman of the Department of Zoology and acting Dean of the College of Medicine. When a permanent location for the College of Medicine of the University was to be chosen, Dr. Wolcott selected Omaha, but he himself chose to stay at the main University in Lincoln, as Dean of the Junior Medical College there, and to con-



ROBERT HENRY WOLCOTT

tinue his administration of the Department of Zoology. In 1915 he severed official connection with the College of Medicine, and assumed the more restricted duties of Professor of Zoology and Chairman of the Department, which remained his status until his death.

Dr. Wolcott's interest in living things was not confined to the field of ornithology. He was keenly interested in entomology as a boy and young man in Michigan, and continued that interest during his residence in Nebraska. His particular interests lay with the butterflies, moths, and beetles. At the time of his death he left an incomplete treatise on the butterflies of Nebraska, and a similar account of the tiger-beetles and other families of beetles as represented in that state. His most serious interest, however, was in the family of American water mites, in which group he became, through researches carried on at Nebraska during the decade beginning about 1898, the generally regarded American authority. In 1905, he published a synopsis of the genera of water mites, this paper following revisions of the North American species of several of the genera of the group. During the last few years of his life he devoted a great deal of labor to a text-book in beginning zoology, which was published under the title *Animal Biology* only a short time before the onset of his fatal illness. Dr. Wolcott was one of the co-authors of the *Preliminary Review of the Birds of Nebraska*, published in 1904, and author of *An Analysis of Nebraska's Bird Fauna*, published in 1909, his two most important contributions to ornithology.

For almost the whole of his very active life, Dr. Wolcott was in splendid health, due in part, no doubt, to his love of the out-of-doors, to which he resorted at every opportunity. He was an enthusiasitc sportsman, and was elected an honorary member of the Lincoln chapter of the Izaak Walton League. Through his summer teaching work, he was able to broaden his field experiences in different parts of the United States. In the summers of 1901, 1904, 1905, 1907, 1924, and 1925, he was in charge of the biology courses at the University of Missouri, at Columbia. In the summers of 1923, 1926, and subsequently, he carried on similar work at the Puget Sound Biological Station in Washington state. He joined the American Ornithologists' Union in 1901 and in 1903 was elected a member of that organization. In 1924 he became an active member of the Wilson Ornithological Club and remained so up to the time of his death. In 1909, he was invited to represent Nebraska in the Advisory Council of *Bird-Lore*. He was a Fellow of the American Association for the Advancement of Science, and a member of the American Society of Zoologists.

American Society of Naturalists, American Microscopical Society, Ecological Society of America, Entomological Society of America, Nebraska Academy of Science, and an honorary member of the Michigan Academy of Science, in addition to those societies mentioned above. He belonged also to the Society of the Sigma Xi, Phi Delta Theta fraternity, and the American Association of University Professors. He was a thirty-third degree Scottish Rite Mason, and his burial in Wyuka Cemetery in Lincoln, on January 25, was in charge of Lincoln Lodge No. 19, A. F. & A. M.

University of Nebraska.
Lincoln, Nebr.

BIRDS AT A RAIN-POOL IN MASSACHUSETTS IN OCTOBER, 1933

BY SAMUEL A. ELIOT, JR.

Readers of the Wilson Bulletin may be interested to imagine the Connecticut Valley of New England as a miniature Mississippi Valley—a north-south trough (a natural migration route) with high ranges on the west and lower hills on the east. But the average mid-western bird-student might be surprised that although it is so near the ocean, this minor inland river-system, with all its ponds and swamps, lacks or almost lacks a number of water birds. Just because the sea is within rather easy flying-distance, sea-loving birds are hardly more than accidental in the middle section of the Valley (that which crosses Massachusetts), and most shore birds are rare. Among our "accidentals" may be named the Red-throated Loon, Leach's Petrel, Gannet, Barrow's Golden-eye, Surf Scoter, Ruddy Turnstone, Hudsonian Curlew, Knot, Purple Sandpiper, Red Phalarope, Great Black-backed Gull, Laughing Gull, Common Tern, and Dovekie. Among water birds which are now and then recorded, not by accident but as transients in very small numbers, we list the Double-crested Cormorant, American Brant, Snow Goose (probably Greater), Gadwall, Shoveller, Redhead, Canvas-back, Old-squaw, White-winged Scoter, Ruddy Duck, Red-breasted Merganser, Golden Plover, Black-bellied Plover, Willet (probably Western), Red-backed Sandpiper, Dowitcher (subsp.?), Sanderling, Northern Phalarope, Black Tern, and Brünnich's Murre. At the seashore, a hundred miles away, most of these are regular and some are abundant. Many of them are far more common in the middle of

North America, a thousand miles inland, than here. Common both farther inland and on the coast, but not yet once discovered here, are the Piping Plover, Western Sandpiper, and others.

With great delight, therefore, was I shown by a bird-loving friend a rain-pool in Hadley that teemed with water birds. It had existed only since the terrific rain of September 16, 1933, and was not found until September 30. It filled the lower angles of two fields separated by a brook—a bare tobacco-field on the east, a weedy cornfield on the west. Farther east was a steep ascent, clothed with birch and maple; farther west, more farm-fields; to the north the bush-bordered brook, and to the south a stretch of half-drowned, boggy land in which one could often find shore birds that one had missed at the pool itself. The Connecticut River makes a great bend around Hadley, and this pool was not far east of a straight line across the peninsula, such as migrants flying down-stream would be likely to take. When flushed, the birds usually flew southwest or northwest towards the nearer parts of the river.

The only other places in the vicinity of Northampton where water birds could be looked for with expectancy were in the Oxbow region, five miles southwest of this pool; at the six small sewer-beds of Amherst, four miles east; and at the sandy river-bank, a mile or two south, which is a much better place in the late spring shore bird flight than in summer and fall. A few records of shore birds at these three locations are included in the accompanying table, but they were merely supplementary to the surprising assemblies found morning after morning at the Hadley pool. The latter was forty minutes' bicycle-ride from my home, but so striking was the opportunity that I missed not a morning from September 30 through November 2.

On the first day, the friend who took me to the pool had seen, he said, "a lot of Dowitchers, and some Stilt Sandpipers". The latter has never been recorded here, and Dowitchers (since 1901) only in September, 1905, 1919, and 1928; so I was keenly disappointed that a few hours later neither species could be found. We did observe many Killdeers, several Greater and Lesser Yellow-legs, 3 Pectoral and 2 Solitary Sandpipers, and 1 Snipe; also a dozen Blue-winged Teal, 2 Green-winged, and 1 Pintail. The next day, arriving about sunrise, I noted 10 Blue-wings, 5 Green-wings, the Pintail, 5 Black Ducks, 3 Wood Ducks, and a Pied-billed Grebe, besides the shore birds

recorded on the table. Of these, the great prize was of course the Baird's Sandpiper. At Pittsfield on August 30, 1933, I had made what seems the first record of this species in western New England north of the Connecticut coast. At Hadley, on October 1, I saw the first in the Connecticut Valley.

The two Least Sandpipers of October 1 were seen by another observer later in the morning. The White-rump was noted by still others in the late afternoon, consorting with the Baird's. One Least was at the pool October 2, 4, and 6—probably one and the same bird, temporarily absent on the "odd" days. The species had never previously been seen hereabouts later than September 7. The White-rump, though missed on October 2, was present on the six following days. After a week of none, another showed up on October 16, a third Octo-

FIG. 7. The Rain-pool, with Mt. Holyoke in the distance (left), and Mt. Tom (right), between which the Connecticut River flows. Photographed by Dr. W. Elmer Ekblaw.

ber 19 and 21. On the 22d visibility was poor and the two smaller sandpipers companioning the first thrilling, too-absorbing Red-backed flew away before they were well viewed; but White-rump is the most probable identification. On the 24th no shore birds were at the pool when it was reached, at 7 A. M., but at 7:45 a flock of Killdeers with the still strangely red-backed, unmolted Dunlin I had noted among them on the 23d flew to it from the north, and a small sandpiper, "probably White-rump but perhaps Semipalmated" as I wrote at the time, came from the south and joined them. This flock fed on the upper, dry part of the tobacco field, not at the pool's edge. It flushed

SHORE-BIRDS AT A TEMPORARY RAIN-POOL IN HADLEY, MASS., IN OCTOBER, 1933

[Figures in brackets represent birds reported by other observers there]

Species / Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Killdeer	25	20	20	40	20	15	12	10	12	5	3	9*	5*	26	25	7	30	30	1		60	15	23	25	24	2	4		4		
Ring-neck Plover																		1	1												
Golden Plover					1	1																									
Black-bellied Plover																										1†					
Wilson's Snipe	15	16	20	20	10	15	6	5	25	12	6	9		13	15	10	2	16			12	3	5				4			1	4
Spotted Sandpiper	1‡																1*														
Solitary Sandpiper	2‡	1§	1			1			1	1																					
Greater Yellowlegs	6	8	3	4	2	2	5				1	1	1			2		1	3		1	1‖	2	1‖		1†	1‖		1	3	3
Lesser Yellowlegs	6	4	2	2	3	3	3	2		2																					
Pectoral Sandpiper	6	3	5	2	3	2	1				1		2					1	5		2	1‖			6					2	2
White-rumped Sandpiper	[1]		1	1	1	1	1	1								1			1		1	1		1	2	1¶	3‡		1		
Baird's Sandpiper	1																														
Least Sandpiper	[2]	1		1		1																									
Red-backed Sandpiper																						1	1	1	1	2+	2		[1]		
Semipalmated Sandpiper	1	1	2	2	2	2	3	4	5	7	5	6	5	2	2	2	1	1	1								1				

*—At River.
‡—4 miles east.
‖—5 miles southwest.
+—¼ mile west.
†—2 miles west.
§—1 mile east.
¶—Dead.

promptly, flew far southwest, and descended on another waterless field there. On the 25th, the Dunlin and White-rump were feeding at the water's edge but flew up to join the Killdeers on the higher ground and departed with them for another dry field to the west. Later another, more brownish, scaly-backed, summery White-rump appeared at the pool's margin with two very small Pectoral Sandpipers. On the 26th, after a frigid night, the pool was iced over, but a reconnaissance across the farm land to the west flushed two Dunlins, in the gray dress proper to the season, and chanced upon the headless body of a gray White-rump, probably destroyed by a cat. On the 27th the pool was not visited until noon, when little ice was left. Two Red-backs were there, with—not a White-rump—but a most surprising Semipalmated Sandpiper. This species had shown an orderly wax and wane in the first nineteen days of October, its numbers swelling to a maximum of seven on October 10, then dwindling evenly to the last one, October 17-19. Our latest previous date had been October 11 (1919) at Springfield. Three White-rumps on the 27th had, however, already been seen at the Amherst sewer beds. The last was at the partly frozen pool at noon October 29; and a second small sandpiper, probably of the same species, flew off before it could be well observed. Later that day a friend found there the last Red-backed Sandpiper. Our latest White-rump record is October 31, 1925, but the Red-back has been very rare with us (the only recent record I know of is October 16-17, 1932); so these several late-coming birds at or near the pool were a very welcome find.

On only two days in all October did I completely miss water birds at this pool. October 20 was the first day of the pheasant-shooting season and I suppose that early hunters had scared the birds away before I got there. October 28 a strong north wind was blowing, and the birds were probably in the more sheltered, marshy country just to the south, where on October 30 and 31 I found the three species recorded on the table for those days. On November 1 these had gone and a single Killdeer was all I could find; November 2 there was nothing, and I ceased daily visits. On November 8, though the pool itself was frozen, two Greater Yellow-legs were to the south; and on November 11, when not a bit of unfrozen water or soil remained, one bird of this species, young-of-the-year, flew mournfully by, southeastward, faintly calling. Our latest previous date for Greater Yellow-legs was October 24, 1932.

The Lesser Yellow-legs, hitherto not known later than September 26, lingered at the pool until October 10. The Solitary Sandpiper was

last seen that same day. It has been recorded as late as October 20 (1929). The Spotted Sandpiper was not noted at the pool at all, but one was on the sandy river-beach October 17, two weeks later than its normal departure-date. The Pectoral Sandpiper resembled the Greater Yellow-legs in numbers and dates. It has become much more common here in the last few years than it used to be. The "Birds of Massachusetts" gives October 30 as its normal, November 11 as its latest, final date, but we know of one killed twenty miles south of here on November 23, 1901, at a still-open meadow spring. Two snipe were shot with it, and once or twice snipe have occurred even in December, but the extraordinary thing about the Hadley snipe of October, 1933, was not their date or even their large flocks but their overt, unwary assembling on the bare tobacco-field, where they probed the mud left by the slowly evaporating pool precisely as dowitchers might. Only their peculiar crouch, and immobility in that ungraceful pose, showed that instinctively they still relied on protective coloration—effective indeed among grasses but almost useless on this exposed site. Prominent they certainly were, second in this respect only to the Yellow-legs and Killdeers. Killdeers were the most noticeable bird about the pool, the only one remarked by most passers-by. The sixty counted on October 21 formed the biggest aggregation of Killdeers we have ever beheld here. This species was always the first to take alarm, and give it. In the early part of the month one flushed the Killdeers and, counting them in the air, watched them depart with real relief to be rid of their screaming, before one tried to scrutinize the other birds present. If any had flown away with the Killdeers, it or they usually returned at once, whereas the two-belted alarmists were not likely to come back while the observer stayed.

The three other plovers provided the happiest surprises, next to the Baird's Sandpiper, of this unprecedented shore bird month. The Golden Plover's arrival and departure, both, were witnessed. At 7:30 on October 5, a cloudy day of chill northeast winds, its sharp iambic call in the northern sky heralded its descent to the pool, where it associated with the Pectorals, Semipals, and White-rumps. It made a long flight westwards towards the river when too closely neared, but returned when the regretful observer retired. The next morning, about the same hour, after a night of rain, this immature plover rose into the air with the first scary Killdeers and headed their flock, flying with a single sharp call almost directly south. The Killdeers zigzagged and circled; they were not bound for South America; but this dark-eyed youngster, all alone, absolutely inexperienced in migration,

seemed to have a compass in his brain, knew what was "south" and went there, straight and swift. Once an abundant fall migrant down our river (Forbush, 1912, p. 344), the Golden Plover has been almost absent for half a century. The only recent record before this was one of a similar lone young bird associating with Killdeers on the river sands, August 31, 1931.

The Semipalmated Plover was a very tired, quiet young-of-the-year discovered at the pool's edge at 7:30 on October 18. The single Pectoral and Semipalmated Sandpipers bathed, preened, and fed close by it, while it stolidly rested. At 8:30 next day it was more active, and it was seen by others that afternoon. It probably departed early October 20 when every other shore bird deserted the pool. This species has become a regular late-May transient in recent springs, but is still unusual on its southward flight, and our latest date heretofore was September 12.

The Black-bellied Plover is merely casual with us, and when the young bird of October 26 was first glimpsed, running over a harrowed field near a frozen little pool, and a single Killdeer, it was taken for another Golden. Like the Golden, it returned after being flushed. Its long bluish legs and cool rather than brown coloration looked suspicious, and of course in flight its white croup, black axillars, and warble positively identified it. The previous night had been very cold (the main pool, two miles farther east, was ice-skimmed and without birds), and this occurrence seems phenomenally late.

The ducks that were at the pool on October 1 have been mentioned above. On October 2 there were 12 Green-winged Teal. October 3, stalking the western, weedy part of the pool behind corn-shocks, I got close to a flock "dipping" on it of 12 Green-wings, 1 Blue-wing, 6 Black Ducks, a female Mallard, 3 Pintails, and a male Wood Duck. This was the high point. October 5, 1 Green-wing and 2 Pintails; October 6, 2 Green-wings; October 7, a Pintail and a Black Duck; October 11, 1 Pintail; October 15, 2 Green-wings; October 16, the same (?) two in the air, closely accompanied in all their evolutions by six snipe; October 17, 2 Black Ducks, 1 Green-wing, and 2 larger, white-bellied ducks, either Wood or (I rather guess) Baldpate; and October 18, 1 Black, completes the duck story. Such a list, for a temporary, shrinking pool exposed to a road (and the duck-shooting season opened on October 16), is somewhat notable.

Of land birds the most conspicuous were Pipits and Rusty Blackbirds. The former were seen every day and were more numerous than I ever imagined they could be here, but on the last three days of Octo-

ber only a few appeared, and on November 1 and 2 only a single bird. The Rusties swarmed in the cornfield, but they too declined in numbers after October 25, whereas Grackles and Redwings proportionately increased then. Several times Redwings attacked Yellow-legs in the air, as if the latter were birds of prey, but the other blackbirds did not. Horned Larks first appeared October 23, and were noted in small flocks, flying, on most subsequent visits; and on October 30 hundreds of them were studied on the meadows to the west, and found to include a white-browed Prairie Horned Lark among each fifty or so Northerns. In the thickets to the east the first Fox Sparrow of the fall was noted on October 16, and the first Tree Sparrow October 21. A single Mourning Dove (rare here in autumn) was present for eight days, October 18-25. Remarkable late records were those of an adult male Nashville Warbler October 19 and 20, a Phoebe October 23, and a Northern Yellowthroat October 26. A Junco with peculiarly blackish coloration, extending farther down its breast than usual, and with two distinct but narrow white wing-bars, was observed at close range on October 23; and another with brown back and pinkish sides on October 28; but no names or claims are to be attached to either. Eight or nine kinds of hawks were noted during the month, including a Duck Hawk October 31 and two Rough-legs October 16 and 29; and the body of a recently shot Short-eared Owl was stumbled on in the fields to the west on October 31.

Disappointments, besides that at the failure to confirm my friend's Dowitchers and Stilt Sandpipers, were the absence of Sanderling, Western Sandpiper, Phalaropes, Coot, Gallinule, Ruddy Duck, and Horned Grebe. For each, I entertained some hope until the ice closed down. So far as I know, no member of the heron family ever visited the place, and I heard of but one Woodcock in the adjacent thickets. But a backward survey of the thirty-four consecutive visits paid to this spot is deeply satisfactory, and a gratifying memory to keep for years to come.

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BIRD NOTES FROM THE BIGHORN MOUNTAIN REGION OF WYOMING

BY JOHN W. ALDRICH

During the summer of 1930, I spent the months of July and August collecting birds for the Cleveland Museum of Natural History in the central northern part of Wyoming. During about six weeks of my stay I made my headquarters on the Bear Claw Ranch which is owned by Dr. Gordon N. Morrill, of Cleveland. This ranch is located on the northeastern slopes of the Bighorn Mountains four miles northwest of Dayton, and about seven miles south of the Montana border. The elevation of the ranch varies from 4,500 to 5,500 feet. The other two weeks were spent in the mountains themselves at altitudes varying from 7,000 to 11,000 feet.

The birds obtained on this trip have been carefully identified by Dr. Harry C. Oberholser by comparison with large series of specimens. The nomenclature used is as given by him. The following annotated list is comprised of such species as were deemed worthy of report because of the unusualness of their occurrence in the region described or because the locality was close to the supposed limits of their range. In most cases specimens were taken and when this was not the case the bird is not here recorded unless it is one with which I am very familiar in the field.

CANADIAN LONG-BILLED CURLEW. *Numenius americanus occidentalis.* Two juvenile specimens, male and female, were taken on the open prairie at Bear Claw Ranch, altitude 4,500 feet, on July 20. These two specimens were taken from a group of three birds seen on several preceding days near the same place.

BLACK-BILLED CUCKOO. *Coccyzus erythropthalmus.* On July 3 two of these birds were seen in the fringe of aspen and box elder bordering Smith Creek at about 4,500 feet. On almost every day thereafter one individual was observed up until July 20. No specimens were taken, but on one occasion, when I was not collecting, I was successful in calling the bird up to within fifteen feet of where I stood by imitating its call. At this distance the red eye-ring was clearly visible and identification positive.

WESTERN RED-HEADED WOODPECKER. *Melanerpes erythrocephalus erythrophthalmus.* Only one of these birds was seen on the trip. It was a juvenile male specimen collected on the Tongue River near Dayton on July 26.

WESTERN KINGBIRD. *Tyrannus tyrannus hespericola.* This species was seen regularly all over the countryside below 6,000 feet. One

pair nested near the ranch house. One or more birds were seen on every trip around the ranch. On August 6, eight kingbirds were seen in the vicinity of Dayton.

CATBIRD. *Dumetella carolinensis.* In brushy places about the ranch one might expect to run into this species fairly regularly. On July 3 and 4 I saw six birds each day. One was seen almost daily in the flower garden beside the house.

AMERICAN PIPIT. *Anthus spinoletta rubescens.* Above timberline (10,000 feet) on the rocky alpine slopes of Elk Peak, which was climbed on July 16, this was the only bird recorded. Six pipits were constantly flying nervously about from rock to rock "pipping" continuously. It is assumed that their actions denoted the presence of young birds in the vicinity. Certainly the flocks of pipits which I observed in August behaved in an entirely different manner. The latter birds, which were observed at about 9,000 feet, ran along quietly on the ground and would not have been noticed had they not been flushed by my approach, so closely did their colors harmonize with their surroundings. Even in flight they were absolutely silent. The flock contained both pipits and Western Vesper Sparrows (*Pooecetes gramineus confinis*). The records of pipits seen in the Bighorn Mountains are as follows: July 16, Elk Peak, altitude 11,000 feet, six; August 12, twenty-five miles west of Dayton, altitude 9,000 feet, five; August 13, at the same locality, about fifty. One specimen was collected on August 12.

WESTERN YELLOW WARBLER. *Dendroica aestiva morcomi.* In the low willows bordering streams at the lower altitudes this was a very common bird. It was frequently heard singing in the shrubbery about the house. On July 31 a specimen was taken on Bear Claw Ranch at an altitude of 4,500 feet. On August 15 two yellow warblers were seen in the willows along Fool Creek in the Bighorn Mountains at an elevation of 8,000 feet. These individuals probably did not breed there as they had not been seen previously at so high an altitude.

AMERICAN REDSTART. *Setophaga ruticilla.* This species was seen on four occasions in the box elders fringing Smith Creek at an elevation of about 5,000 feet, not more than one pair being seen on any one day. The dates of observations were between July 3 and 29.

BOBOLINK. *Dolichonyx oryzivorus.* Several pairs of these birds were found nesting in the alfalfa fields at Bear Claw Ranch between 4,500 and 5,000 feet. On July 11, I found a young Bobolink just out of the nest and unable to fly more than a few feet. On August 6, a flock of approximately twenty-five juvenile Bobolinks were observed

feeding in the hay fields near Dayton. One of this group was collected.

Bronzed Grackle. *Quiscalus quiscula aeneus.* During the first few days of July a few scattered grackles were seen about the ranch. On July 6 a juvenile specimen barely able to fly was collected near the ranch house. By July 21, flocks of grackles had begun to gather and were seen roosting about in the trees and feeding in the hayfields. These flocks grew steadily in size and on August 27 I estimated 500 birds seen in the vicinity of Dayton. Fifteen specimens of Bronzed Grackles were collected on July 6, 24, 26, and August 2 and 3. All of these turned out to be juvenile birds in various stages of molt.

White-winged Junco. *Junco aikeni.* On August 12, a juvenile female specimen of this species was collected from a flock of Pink-sided Juncos (*Junco mearnsi*) in the Bighorn Mountains, twenty-five miles west of Dayton at an altitude of 9,000 feet. If this example represents a breeding record, as it seems to do, it is an extension of the breeding range of the species from the Bear Lodge Mountains in the northeastern corner of Wyoming.

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WATER BIRDS OF A VIRGINIA MOUNTAIN COUNTY

BY J. J. MURRAY

A mountain county in Virginia seems an unpropitious place for the study of water birds. And it is true that as compared with the coastal regions of any of the Atlantic states or with the lake country of the north our water bird life is not large. But in the course of a considerable amount of field work, with special reference to water birds, I have been struck with the number both of species and individuals that can be found here. So little work has been done in this section during the migration period that the results of this field work may be of some interest.

The county on which this study is based is Rockbridge County, Virginia, and the data were gathered over a period of five years, from 1928 to 1933. Rockbridge County, taking its name from its famous Natural Bridge, is centrally located in the Valley of Virginia, just south of latitude 38°, and about two hundred miles from the coast and the great tidal waters of Chesapeake Bay. The northern boundary of the county is the watershed between the Shenandoah and James River systems; the eastern is the crest of the Blue Ridge; while the western runs along the top of some outlying ridges of the Alleghanies.

The altitude at Lexington, the county seat, is 1,000 feet, most of the valley land running from 800 to 1,500 feet. The mountains generally reach an altitude of something over 3,000 feet, some points in the Blue Ridge rising to 4,000 feet. One can pass in an air line distance of seven miles from an elevation of 750 feet at Balcony Falls Gap to 4,000 at the peak of Thunder Hill. The eastern half of the county, from the foot of the Blue Ridge westward beyond Lexington, is rolling hill country, while the western half is very rugged, with high hills, mountain ridges, and isolated peaks. The fauna of the valley floor is Carolinian, while that of the higher foothills and mountain areas covers the extremes of the Alleghanian zone. One would expect to find the Canadian zone in areas above 3,500 feet, but since these areas only occur as islands and there are no high coniferous forests no Canadian birds have been found breeding within the county.

Rockbridge County has but one large river, the James, which cuts across its southeastern corner. Most of its territory is drained by the North River, a small tributary of the James, with two branches, the South River, flowing at the foot of the Blue Ridge, and the North River proper, or Maury River, coming out of Goshen Pass in the Alleghanies and flowing east through the center of the county. The county is abundantly supplied with small streams, all of which are swift and rocky, with only occasional stretches of quiet, deep water. There are no natural lakes. The Adcox Knob Lake, from which Lexington gets its water supply, is an artificial lake high up in the mountains covering about fifteen acres and surrounded by woods. The caretaker tells me that flocks of ducks stop on it at times, but the only birds that I have found on my occasional visits are Pied-billed Grebes. Cameron's Pond, three miles north of Lexington, is a shallow marshy stretch of water of three or four acres, varying greatly in size according to the wetness of the season. It is surrounded by open pasture, except for a willow thicket at one end. There are no houses near. I have driven an automobile within a few feet of the water's edge and watched ducks feeding a hundred yards away, sometimes forty to sixty individuals and as many as six species at once on this tiny pond. Big Spring Pond, seven miles west of Lexington, is slightly larger, with long finger-like reaches stretching away from the main area. It is fed by large springs. The water is from two to five feet deep, grown up except in the center with cat-tails, *Nymphaea*, *Bidens*, and other water plants. At the ends there are thickets and patches of open woods. For the rest it is surrounded by pasture and bordered by a farm yard. In spite of the fact that the farm house is situated on the hillside only fifty yards

from the water ducks come to the pond rather freely. Most of my water bird records have been made at Big Spring and Cameron's Pond.

Surprisingly small places are utilized here by water birds during the migrations. I have known ducks and grebes to spend the night on the city reservoir, which is merely a concrete basin some thirty yards in diameter, set on an open hilltop near a highway. In spite of the small number of suitable places I have listed twenty kinds of ducks. Marshy spots are very scarce in a region like this and mud banks not at all common, consequently fewer species of shore birds have been recorded. We have only one resident water bird, the Killdeer, and only four summer residents of which I am sure, the Great Blue Heron, Green Heron, Upland Plover, and Spotted Sandpiper. The Pied-billed Grebe, Bittern, and Woodcock possibly breed very sparingly. This paper presents data on fifty species of water birds, all but one of which I have personally observed. The list follows:

Common Loon. *Gavia immer immer*. Rare transient. Mr. Chas. O. Handley, who was a student at Washington and Lee University at Lexington from 1919 to 1921, saw one on North River, May 8, 1921. One was shot on the same river about 1890. An injured bird was brought to me on December 13, 1932. It died a few days later after being liberated at Big Spring.

(I have seen a mounted specimen of a Red-throated Loon (*Gavia stellata*) in winter plumage which had been taken near Covington, in the adjoining county of Alleghany. On April 14, 1933, from the top of Jump Mountain (3,190 feet) I saw a flight of seventeen loons. They were too high overhead for me to be certain about the species but appeared small enough for *stellata*).

Horned Grebe. *Colymbus auritus*. Uncommon transient. Mr. Handley tells me that a dead bird of this species was found on April 11, 1920. I saw four in bright breeding plumage at Cameron's Pond, April 13, 1928; one in winter plumage on North River, December 24, 1929; two in breeding plumage at the city reservoir, March 31, 1933; and one in gradually deepening breeding plumage at Cameron's Pond, March 24 to April 13, 1933.

Pied-billed Grebe. *Podilymbus podiceps*. Fairly common transient, in spring, March 19 to May 18; in fall, September 1 to November 17. I saw twenty-one together at Adcox Knob Lake, September 17, 1928. Prof. R. S. Freer, of Lynchburg, Va., and I watched a pair at Big Spring, April 3, 1931, in courtship antics, one in full breeding plumage with bill distinctly banded, the other still in the duller hues of winter. The fact that a grebe was seen there as late as May 18

makes me think they may have bred. At this season and later the growth of *Bidens* in this pond is so high as to make it almost impossible to locate nesting birds.

Double-crested Cormorant. *Phalacrocorax a. auritus.* Accidental. On April 30, 1924, a cormorant struck a high chimney on the campus of Washington and Lee University and fell, only slightly injured. It was kept alive for several days, some of the students fastening a cord to one of its feet and taking it to a nearby stream, where it dived for fish. It later escaped, was shot and brought back to the biological laboratory. It was preserved in alcohol but was later thrown away. I did not know of it until too late to see it. It was identified as a cormorant. There was some question at the time as to the species, but it was most likely, of course, *auritus.*

Great Blue Heron. *Ardea h. herodias.* Uncommon summer resident March 2 to September. Seen mainly along North River and Buffalo Creek. I have no evidence of breeding. One bird has wintered each season from the fall of 1928 to the spring of 1932 in the neighborhood of Big Spring, which because of its springs never completely freezes over.

American Egret. *Casmerodias albus egretta.* Rare summer visitor. I had it reported to me by a good observer in the summer of 1929. I saw one at Big Spring on many occasions from July 26 to September 26, 1932; one at Roop's Pond, near Lexington, July 9, 1933; and two at Big Spring July 18, 1933.

Little Blue Heron. *Florida c. caerulea.* Fairly common visitor in mid-summer in the white phase, June 29 to September 5, mainly in early July, occurring usually in small flocks but sometimes as many as twenty together. I have seen them at Cameron's Pond and Big Spring, and they occur at other small ponds. They seem to be increasing in number, and during July, 1933, were abundant. I have seen no blue birds here.

Eastern Green Heron. *Butorides v. virescens.* Common summer resident, March 22 to October 21. I found a nest with two eggs, May 20, 1927, in an apple orchard a mile from the nearest stream; a nest with four eggs, June 28, 1932; and other nests with young late in June.

American Bittern. *Botaurus lentiginosus.* Uncommon transient in spring. Eight records, April 1 (1933) to May 18 (1931). It is possible that this last date may indicate a breeding bird.

Common Canada Goose. *Branta c. canadensis.* Rare transient, formerly common. Flocks are not infrequently heard passing over, but I have only two recent records of their stopping. I saw three at

Big Spring, March 30, 1931. One of these was noticeably smaller than the other two, apparently small enough to be a Hutchins's Goose (*B. c. hutchinsi*). They were within a stone's throw of the farm house but did not appear very restless, not even taking flight when I exposed myself to view. The caretaker at Adcox Knob Lake reported fourteen on November 19, 1931.

COMMON MALLARD. *Anas p. platyrhynchos.* Common winter visitor, October 3 to April 8, less common in mid-winter. Although not so common as several other ducks, this is the most generally distributed of the ducks that occur here.

RED-LEGGED BLACK DUCK. *Anas r. rubripes.* While it is usually too difficult to distinguish this subspecies from the next in the field, I have felt certain of seeing this form in one or two cases, particularly an apparently crippled bird that I watched for a long time from cover at very close range at Big Spring on April 4, 1930. The bright coral legs and yellow bill were clearly seen in bright sunlight.

COMMON BLACK DUCK. *Anas rubripes tristis.* Common transient, October 29 to December 24, and March 5 to April 13. I have a record for February 1, 1930, but no January records. I also have records of a crippled bird on May 27 and 31, 1930. On July 2, 1930, I saw two standing on a rock in Buffalo Creek that showed no signs of being crippled. When I stepped out of the automobile they rose rapidly and flew away at high speed.

GADWALL. *Chaulelasmus streperus.* Rare transient. Two males and a female were seen at Big Spring, along with three Black Ducks, on various occasions from November 25 to December 30, 1929; a female at Cameron's Pond, October 31, 1932; and a pair at Cameron's Pond, November 7, 1932.

BALDPATE. *Mareca americana.* Uncommon transient. I have five spring records, March 11 to 28, including a flock of eight males in very bright plumage and six females at Cameron's Pond, March 11, 1930; and a male, with crown strongly tinged with buff, along with two females at Big Spring, March 20, 1931; also one fall record of a female at Big Spring from October 27 to December 2, 1930.

AMERICAN PINTAIL. *Dafila acuta tzitzihoa.* Uncommon transient. I have six spring records of some eighteen birds, February 20 to April 6; also one fall record of a female brought to me on November 13, 1928, a male having been shot at the same time.

GREEN-WINGED TEAL. *Nettion carolinense.* Transient, fairly common in spring, March 16 to April 18; scarce in fall, three records, October 31 and November 1 and 3, all in 1932.

BLUE-WINGED TEAL. *Querquedula discors.* Transient, common in spring March 20 to May 12; one fall record, a female at Big Spring, October 1, 1931. They occur on the rivers as well as on the ponds. I have seen as many as twelve in a flock.

SHOVELLER. *Spatula clypeata.* Transient in spring, uncommon, nine records of some sixteen birds, March 23 to April 8; one fall record, a male at Cameron's Pond, November 12 and 14, 1932.

WOOD DUCK. *Aix sponsa.* Rare transient in spring. Mr. Handley saw a male fly up from the ground on the bank of North River some time in the spring of 1922. I have seen the following at Cameron's Pond: a female, March 8, 1930; a pair, April 4, 1930; a pair, April 14, 1930.

LESSER SCAUP. *Nyroca affinis.* This is our commonest duck, occurring mainly in spring, March 11 to May 4; one fall record, a male at Cameron's Pond, November 12 and 14, 1932. I saw a male on June 10, 1929, and a pair on June 13, 1929, which were probably cripples although they could fly well, and another male on July 6, 1929, that was still badly crippled. These late birds were at Cameron's Pond.

REDHEAD. *Nyroca americana.* Rare transient. A male seen at Cameron's Pond and on North River from March 20 to April 6, 1929. It was very tame, swimming in the river without noticing cars passing on a highway not over thirty yards away. A female was seen on May 2, 1932.

RING-NECKED DUCK. *Nyroca collaris.* Uncommon transient, nine records of twenty-eight birds in spring, March 18 to May 2; three fall records, a female brought to me from Buffalo Creek on November 25, 1929, a female at Cameron's Pond on October 31, 1932, and a male on North River, December 12, 1932.

CANVAS-BACK. *Nyroca valisineria.* Rare transient, one female at Cameron's Pond, March 24, 1933.

AMERICAN GOLDEN-EYE. *Glaucionetta clangula americana.* Uncommon transient. Five records: a male found dead at Cameron's Pond, March 18, 1929; a male in North River, April 3, 1930, swimming near a much travelled road and but little disturbed by the passing cars; a female at Big Spring, December 22, 1932; a male, March 21, 1933; a female, April 21, 1933.

BUFFLE-HEAD. *Charitonetta albeola.* Rare transient. Three records, a female, April 15, 1929; a female, March 23, 1932; and a young male, March 28, 1932; all at Cameron's Pond.

OLD-SQUAW. *Clangula hyemalis.* Rare transient. One record, a

male with molt to summer plumage incomplete, April 14 and 15, 1929, at Cameron's Pond.

Ruddy Duck. *Erismatura jamaicensis rubida.* Uncommon transient, four spring records and one fall record, all in female or immature plumage: Big Spring, November 17, 1930; Reservoir, November 11 and 12, 1932; Cameron's Pond, November 8 and 10, 1932, November 21, 1932, and April 3, 1933.

American Merganser. *Mergus merganser americanus.* Rare transient. An adult female was brought to me by a hunter on January 14, 1930, and I have the skin. He said that he had shot three out of a flock of a dozen, all of which resembled this one. On January 5, 1933, I saw a male on James River at Snowden, just outside the county.

Hooded Merganser. *Lophodytes cucullatus.* Fairly common transient in spring, March 17 to April 21, occurring in pairs and small flocks at Cameron's Pond, Big Spring Pond, and on North River.

Northern Clapper Rail. *Rallus longirostris crepitans.* Accidental. A very unusual record is that of a specimen of this salt water bird which was found dead, hanging on a barbed-wire fence, on a country road near Lexington, about November 1, 1928. The feathers were very much soiled but the body was mummified and without odor, as it had dried out in the wind and sun. It was identified by Mr. J. H. Riley and Dr. C. W. Richmond of the U. S. National Museum, where I deposited the specimen. I believe this is the only record of this species at any distance from the salt marshes. For a fuller account *cf.* the *Auk*, XLVI, January, 1929, page 106.

Virginia Rail. *Rallus l. limicola.* Rare transient. I saw one in dull plumage at Big Spring Pond, September 26, 1932, and what was probably the same bird on October 1. I do not see why this bird should be so rare here.

Sora. *Porzana carolina.* Common transient, in spring from April 13 to May 27, and in fall from August 29 (and probably earlier) to October 29, at Cameron's Pond and Big Spring. It was scarce in the spring of 1931 and 1932, and absent in the fall of these years and in the spring of 1933. On June 9 and July 7, 1930, I heard rails at Big Spring which sounded like this species but of which I could not get sight.

Florida Gallinule. *Gallinula chloropus cachinnans.* Rare transient. Three records. One was captured by a negro boy near East Lexington, May 1, 1927, and brought to the biological laboratory of Washington and Lee. I saw one on April 19 and 25, 1929, and another on May 3, 1932, both at Big Spring. I have heard sounds at the same place in summer that suggest this bird.

American Coot. *Fulica a. americana.* Fairly common transient, in spring from April 4 to May 6, in fall from October 9 to November 14. One winter record of two birds on December 5, 1932.

Semipalmated Plover. *Charadrius semipalmatus.* Rare transient in spring. I saw one on May 12 and 15, 1929; six on May 13, 1932; three on May 14, 1932; one on May 17, 1932, all at Cameron's Pond.

Killdeer. *Oxyechus v. vociferus.* Resident, common in summer, fairly common in winter. They raise two broods, as I have seen downy young on May 25 and on June 27.

American Woodcock. *Philohela minor.* Uncommon transient, possibly remains occasionally to breed. Mr. Handley saw one, September 27, 1921. One was brought to me on November 15, 1928, that had been shot on a high wooded hill where a covey of Bob-white had been scattered. The hunter thought when he shot at it that it was one of the covey rising. I saw one one June 2, 1930, in a marshy spot near Lexington; one at Big Spring, September 14, 1931; two in a marsh near Glasgow on James River, September 28, 1931; and two on March 21, 1932, on a hill in thin woods.

Wilson's Snipe. *Capella delicata.* Common transient in spring, February 20 to May 7; uncommon in fall, September 14 to November 21. I have two winter records at Big Spring, January 13, 1930, and December 8, 1931.

Upland Plover. *Bartramia longicauda.* Fairly common transient, uncommon summer resident, from April 6 to July 23 (and possibly later). They were once common in this section, I am told, but now only a few small flocks are seen passing north in spring, and a few pairs remain to nest. This must be the extreme southern limit of its breeding range now. I saw a nest in a hay field, June 3, 1930, with four young just hatched and still about the nest. A farmer caught a half-grown young bird not far from this spot on June 21, 1933.

Spotted Sandpiper. *Actitis macularia.* Common summer resident, April 25 to July 18 (and probably considerably later, for I have been able to do little field work in late summer). I have found young just from the nest from June 8 to July 2. I have seen the birds lead their young out into the grain fields some distance from water, the adults flying about over the young and alighting on fence posts and shocks of grain.

Solitary Sandpiper. *Tringa s. solitaria.* Transient, common in spring, from April 6 to May 18, less common in fall from July 26 to as late as October 28.

Greater Yellow-legs. *Totanus melanoleucus.* Uncommon tran-

sient in spring, April 5 to May 14, mostly at Cameron's Pond, a few at Big Spring.

LESSER YELLOW-LEGS. *Totanus flavipes.* Common transient in spring, April 2 to May 17, mostly at Cameron's Pond—a few at Big Spring.

PECTORAL SANDPIPER. *Pisobia melanotos.* Rare transient. Prof. R. S. Freer, Mr. M. G. Lewis, and I saw five in a marshy place along the Lee Highway two miles south of Lexington, April 3, 1931. One of them, which already had a broken wing, I collected. I saw three at the same place on April 5 and 8, 1931.

LEAST SANDPIPER. *Pisobia minutilla.* Fairly common transient in spring, April 2 to June 13, all at Cameron's Pond.

SEMIPALMATED SANDPIPER. *Ereunetes pusillus.* Uncommon transient in spring. Five records: one, May 7, 1928; three, May 12, 1929; three, May 15, 1929; two, May 11, 1932; one, May 13, 1932, all at Cameron's Pond. I have taken specimens of the Least and Semipalmated Sandpipers in order to make identification certain. A small sandpiper seen on September 5, 1932, seemed to be this form rather than the Least.

RING-BILLED GULL. *Larus delawarensis.* Accidental. I collected an adult female at Big Spring, February 13, 1932, which was already crippled. It was in winter plumage and was very thin. It was feeding in shallow water. Several times, as it flew about the pond, it lit on the ice, and twice lit in the snow on a nearby hillside.

BONAPARTE'S GULL. *Larus philadelphia.* Rare visitor. Mr. M. G. Lewis, then of Lexington, saw one in adult breeding plumage at Cameron's Pond, April 29, 1928; and I saw another in adult breeding plumage at the same place and, curiously enough, on the same day in 1929. The latter bird stayed in the neighborhood for several days. I saw two adults in winter plumage resting on Maury River at East Lexington, January 8, 1932.

BLACK TERN. *Hydrochelidon nigra surinamensis.* Accidental. Mr. Handley saw one over Maury River near East Lexington, May 10, 1919; and I saw one in adult plumage at Big Spring, May 18, 1931.

NOTE: Since this paper was prepared I have recorded two additional species in Rockbridge County: an adult Black-crowned Night Heron, *Nycticorax n. hoactli*, seen at Cameron's Pond, April 10, 1934; and a Red-breasted Merganser, *Mergus serrator*, probably an immature male, shot at Goshen Pass, December 13, 1934, the head and wing of which were given to me.

LEXINGTON, VIRGINIA.

CHANGES IN THE LIST OF BIRDS OF YELLOWSTONE NATIONAL PARK

BY EMERSON KEMSIES

The following notes are intended as a partial revision of the author's paper published in the WILSON BULLETIN on the birds of Yellowstone Park.* Seven new species are here added and three subspecies are dropped. The total recorded for the Park thus is 216 species and subspecies.

Although Yellowstone is the oldest of the National Parks and it has become known the world over as a game preserve, comparatively little work has been done on the bird life and practically nothing on the winter bird life.

Two birds which are nearly extinct still breed in small numbers in the Park, the Trumpeter Swan and the Whooping Crane. It seems also that this region may prove to be one of those transition areas where a good many subspecies intergrade. For these reasons it is hoped that an extensive and thorough study of the bird life may be undertaken in the near future.

WOOD IBIS. *Mycteria americana.* This species was first reported for the Park in July, 1925, by Mr. A. C. Bent. It was again seen the summer of 1930 in the vicinity of Tower Falls by Mr. and Mrs. Arnold of the permanent ranger force. It seems clear that this species is an occasional visitor to the Park during its post breeding season wanderings, a habit which it shares with the egrets and some of the other herons.

TRUMPETER SWAN. *Cygnus buccinator.* During the past summer (1933) I had the good fortune to observe two pairs of these great birds in the Park. One pair had probably but a single young while the other pair had six. It is possible that a few other pairs breed in the Park and a few more in the vicinity; these together with the few known from British Columbia and Alberta are all that remain of this splendid species.

An interesting thing which I observed and of which I have no adequate explanation is that a color phase apparently exists in the young birds. In the brood that I saw with six young, three of the cygnets were pure white while the remaining three were a dark gray. All of the birds were of the same size and about half grown. The single cygnet of the other pair was also pure white.

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*Birds of the Yellowstone National Park, with some recent additions. By Emerson Kemsies. WILSON BULLETIN, XLII, September, 1930, pp. 198-210.

The only reference to the white phase of the young of the Trumpeter Swan that I have been able to find occurs in Wright's "Fauna of Our National Park". Seemingly, Mr. Wright has taken it for granted that the occurrence of phases is well known, for he merely suggests that perhaps the gray young have a better chance of attaining maturity than the white ones.

The permanent rangers who have seen the Trumpeter Swan each summer for years have all noticed the occurrence of both white and gray young in almost every brood.

The only explanation I can offer at this time is one suggested by Mr. C. L. Sibley, of Wallingford, Conn., who suggests that the Trumpeter Swan may be inclined to throw genetic mutations in the same way that the European Mute Swan does. Species as they near extinction show great variation; is it possible that perhaps because of the interbreeding which must be occurring the white cygnets are produced? The entire subject should certainly be studied before the species is extinct.

Common Canada Goose. *Branta canadensis canadensis.* It seems best in the absence of collected specimens to regard all the Canada Geese in the Park as belonging to this form. Therefore, it becomes necessary to drop the Hutchins's Goose of previous lists, now known as Lesser Canada Goose (*Branta canadensis leucopareia*). For a complete study of the races of this species, see Annual Report of National Museum of Canada, "Status of the Races of the Canada Goose", by Taverner.

Ring-necked Duck. *Nyroca collaris.* This species is likely at times to be confused with the scaups, and was not recorded for the Park until the summer of 1930, when attention was first called to it by Ranger Naturalist Cooke. It has since been seen each summer and I saw it this past summer. It is probably a fairly common migrant and may breed in small numbers in the lake region.

Old-squaw. *Clangula hyemalis.* The Old-squaw has been recorded during the past two or three winters by Permanent Ranger Frank Anderson. It probably occurs only as a casual winter visitor.

Sandhill Crane. *Grus canadensis tabida.* Both this form and the Little Brown Crane (*Grus canadensis canadensis*) have been recorded in the Park. In the absence of specimens and since the two races nearly overlap in size, a sight record is hardly sufficient to admit this bird to the Park list. If it does occur it would probably occur only during migration, as it breeds much farther north.

Forster's Tern. *Sterna forsteri.* There is a specimen of this species in the Lake Museum collected the summer of 1931, identified at the time as a Common Tern but should be referred to this species instead. Although this is the only record for the Park I imagine it occurs fairly frequently and may possibly breed in the marshes that border the Lake.

Snowy Owl. *Nyctea nyctea.* Rather strangely this species was not recorded in the Park until November, 1931, when Permanent Ranger Ben Arnold saw one in Lost Creek Valley near Tower Falls.

Great Gray Owl. *Scotiaptex nebulosa nebulosa.* The first record for this species is of a bird seen by Permanent Ranger Frank Anderson in the late fall of 1930. Since then several have been seen and one was collected and is mounted in the Lake Museum. It may breed occasionally in the Park.

Howell's Nighthawk. *Chordeiles minor howelli.* There is a specimen in the Lake Museum which seems clearly referable to this race. A specimen of the Pacific Nighthawk (*C. m. hesperis*) is also in the same collection. Just what the status of the two races in the Park is, I cannot say. It seems quite possible that the two forms intergrade in this area.

Desert Horned Lark. *Otocoris alpestris leucolaema.* No specimens of the larks have been collected in the Park, but specimens collected in Wyoming in nearby areas are of this race. Accordingly it seems best to regard those of the Park as of this race; the sight record of the Hoyt's Horned Lark should be omitted as it is practically impossible to distinguish the two in the field.

Northern Sage Sparrow. *Amphispiza nevadensis nevadensis.* I found this species fairly common in the sage brush areas near Tower Falls in July, 1933. Several people had reported hearing a strange song in this region but had not been able to find the bird. It is probable that it occurs in similar sage brush areas in other parts of the Park; it should be especially looked for in the area between Gardiner and Mammoth.

Lakewood, Ohio.

EDITORIAL

THE PITTSBURGH MEETING proved to be one of the most successful we have held. The annual meeting for this year will be held in conjunction with the American Association for the Advancement of Science at St. Louis, Mo., on December 30 and 31, 1935. The location of the 1936 meeting has not been decided. In 1937 it will be held at Indianapolis, Ind., again with the A. A. A. S. Wheeling, W. Va., has been suggested for 1938.

The following figures give a comparative summary of the organization for the past five years:

	Des Moines 1929	Cleveland 1930	New Orleans 1931	Columbus 1932	Pittsburgh 1934
Local Attendance	106	41	11	92	49
Out-of-town Attendance	96	122	81	65	129
Total Attendance	202	163	92	157	178
Dinner Attendance	77	98	35	69	72*
Titles on the Program	36	33	27	35	39
Honorary Members	9	7	7	7	6
Life Members	5	7	7	10	12
Sustaining Members	66	58	57	75	44
Active Members	245	227	214	175	154
Associate Members	397	479	461	469	407
Total Membership	717	775	744	734	621
Pages in the BULLETIN	272	312	334	256	288
Total Income	$2167	$2451	$2686	$2191	$2230
Fiscal Balance	$530	$675	$731	$547	$842

*A minimum number is given here, since accurate determination was impossible under the circumstances.

It is with much regret that we announce the temporary incapacity of our Treasurer, Mr. Rosene. Mr. and Mrs. Rosene suffered a very serious automobile accident early in January, and they both have been confined to the hospital up to the time of this writing—late February. As a result the customary notices for 1935 dues were not sent out at the usual time. In view of the situation there seems to be no alternative but to send the March BULLETIN to all members regardless of whether their dues are paid for the current year. And we will trust that all members will remit their dues to the Treasurer at their earliest convenience. Those who do not intend to renew their membership for 1935 will confer a great favor by returning to the Editor the copy of the March issue sent to them.

GENERAL NOTES

Conducted by M. H. Swenk

Caspian Terns in North-central Iowa.—A flock of eighteen Caspian Terns (*Hydroprogne caspia imperator*) was observed by the writer at Lake Cornelia, Wright County, Iowa, on September 12, 1934. While this species occurs somewhat regularly as a migrant in eastern Iowa, it is of irregular or rare occurrence through the central part of the state.—PHILIP A. DUMONT, *Des Moines, Iowa.*

Some Shore Birds Collected in South Dakota.—On September 15, 1934, while on an observation trip to Brant Lake, Lake County, South Dakota, a single Buff-breasted Sandpiper (*Tryngites subruficollis*) was seen and collected. Also, on September 16, 1934, a single Ruddy Turnstone (*Arenaria interpres morinella*) was collected at Lake Herman, Lake County, South Dakota. Both of these specimens are now in the permanent possession of the Zoology Department of Iowa State College.—GERALD B. SPAWN, *Zoology Dept., Iowa State College, Ames, Iowa.*

Northern Phalaropes in Northwestern Iowa.—On September 13, 1934, the writer observed a flock of at least 110 Northern Phalaropes (*Lobipes lobatus*) on East Okoboji Lake, Dickinson County, Iowa. These birds were swimming and feeding in the shallow water near the State Fish Hatchery at Orleans Station. Their distinctive habit of "spinning" in the water, presumably to stir up food particles, was interestingly contrasted with the steady feeding of a pair of Sanderlings on the sandy shore near by.—PHILIP A. DUMONT, *Des Moines, Iowa.*

McCown's Longspur in Southwestern North Dakota.—The writer in May, 1934, made a trip through Grant, Adams, Slope, Hettinger, and Bowman Counties, in southwestern North Dakota, and noted particularly the near absence of McCown's Longspurs (*Rhynchophanes mccowni*). At first the idea of the prolonged drouth came to mind as an explanation of its absence; yet here were thousands of nesting Lark Buntings, Horned Larks, and Chestnut-collared Longspurs present, feasting on the tiny grasshoppers. It is apparent that the McCown's Longspur is actually deserting this part of North Dakota as a breeding ground. On the entire trip of a good many hundred miles, on highways and section lines, the writer did not see more than fifteen of the birds.—WM. YOUNGWORTH, *Sioux City, Iowa.*

An October Record of the American Egret in Lee County, Iowa.—A single American Egret (*Casmerodius albus egretta*) was observed by Deputy Wardens Walter L. Harvey, F. T. Tucker, and the writer on October 30, 1934, at Green Bay, Lee County, Iowa. This bird was seen feeding in one of the bayous, and we were able to watch it for some time. Apparently it had been wounded, but it still was able to fly short distances at a time. We concluded that this was the reason for finding this single bird at such a late date, several weeks after the flock of three hundred or more which had been present had moved southward.—LLOYD SMITH, *Lake View, Iowa.*

Specimen of Greater Scaup Duck Found in Northern Iowa.—An adult male Greater Scaup Duck (*Nyroca marila*) was found dead by William Schuenke at Clear Lake, Cerro Gordo County, Iowa, on March 29, 1934. Mr. Schuenke believed the bird was killed by flying into the telephone wires. The head of this specimen was entirely green, no purplish reflections being apparent. The measurements of the specimen in inches are as follows: Wing (primaries straightened along the ruler), 8.75; wing (chord), 8.50; width of culmen, 1.07; exposed cul-

men, 1.87; length of "nail" on bill, .51. This specimen, which was preserved by Mr. Schuenke, constitutes the second authentic existing Iowa specimen of this bird.—PHILIP A. DUMONT, *Des Moines, Iowa.*

Second Record of the Starling in Douglas County, Kansas.—On October 4, 1934, Mr. John McFarland brought to the Museum an adult male Starling (*Sturnus vulgaris*) in the flesh. Mr. McFarland says it was taken about two miles east of Lawrence, from a flock of Cowbirds and Bronzed Grackles, but he could not determine whether there were any more in the flock. This is the second record of the Starling in Douglas County. The first was of two birds taken seven and one-half miles southwest of Lawrence, by Ora Scott and the writer, on December 25, 1933 (*Auk*, Vol. LI, No. 4, p. 534). This bird seems to be increasing rapidly, and has become so common around Wichita that we may expect a nesting record from there soon.—W. S. LONG, *Museum of Birds and Mammals, Lawrence, Kans.*

Eastern Tree Sparrows Wintering in Christian County, Kentucky.—Since Christian County, Kentucky, lies near the southern limit of the area from which wintering Eastern Tree Sparrows (*Spizella a. arborea*) are regularly recorded, the writer offers the following observations. Coming in at the end of an ice storm in late December, 1932, Tree Sparrows were seen periodically on the U. S. Government Hospital Reservation at Outwood, Christian County, Kentucky, for two months. The first record was made on December 25, 1932, eight birds. On January 5, 1933, the number had increased to twenty birds. Thereafter, until February 6, from five to fifteen Tree Sparrows were seen almost daily, consorting with numerous Field Sparrows of the sedge fields. From February 6 to February 22 the birds seemed to have dropped from sight, and none were recorded. However, on February 22, two birds were seen in the same area that the larger flock had occupied earlier. This was the last record of the season. Dr. Gordon Wilson has previously recorded this species a number of times in the WILSON BULLETIN from Bowling Green, Kentucky, which lies somewhat southeast of Outwood, but the writer knows of no time when the birds were seen over so long a period of time as that recorded above.—COMPTON CROOK, *Dept. Biology, Boone High School, Boone, N. C.*

Notes on the American Egret and Little Blue Heron in Iowa.—These two southern-nesting herons are each year becoming more common in Iowa during the late summer and early fall. The birds are found in all parts of the state where the necessary water and food are available, as is evidenced by the following reports. During late August, 1934, American Egrets were seen at East Twin Lake in Hancock County and at Elk Lake in Clay County. The next week a flock of nine of the birds were seen at Storm Lake in Buena Vista County. On August 11, 1934, four American Egrets (*Casmerodius albus egretta*) were seen near Montrose in Lee County, and on the next day seven birds of this species were found feeding on the river at Fairport in Muscatine County. A few days later the first Little Blue Heron (*Florida caerulea caerulea*) was seen on the Iowa River west of Conesville, in Louisa County. During mid-September both species were found in greater numbers along the Mississippi River. On September 11, 1934, a lone American Egret was seen near Montrose in Lee County. A few miles up the river at Devils Lake, Lee County, a count revealed thirty American Egrets and twenty-one Little Blue Herons. The next day was spent in the Green Bay region, and here we saw more than 200 American Egrets

and about 125 Little Blue Herons. On the following day fifteen American Egrets were seen near the mouth of the Skunk River in Des Moines County. The last American Egret seen was on September 15, just above Muscatine. It should be added that all the Little Blue Herons were in the white plumage. This increase in numbers of these two species of southern herons in Iowa is probably due mainly to E. A. McIlhenny's work on Avery Island, and it is reasonable to expect even greater numbers of these birds, with a good sprinkling of Snowy Egrets and other herons, in the next few years.—Wm. Youngworth, *Sioux City, Iowa.*

Some Bird Notes from Belmont County, Ohio.—The following birds were seen at the Belmont Hills County Club grounds, in Belmont County, Ohio, by Victor Kehrer and myself, on August 26 and September 2, 1934.

Broad-winged Hawk (*Buteo platypterus* subsp.). Seen on September 2. Apparently a new record for Belmont County, although this species is a common migrant in other parts of the region.

Osprey (*Pandion haliaetus* subsp.). Observed on September 2, as it dove into the lake for a fish. Although this species is not known to nest in this region, a fisherman reported to us that this bird had been at the lake for at least six weeks previous to the time we saw it. This species is a rather rare migrant for this region.

Pigeon Hawk (*Falco columbarius* subsp.). Seen on August 26 at close range, as it flew over the lake which is on these grounds. I believe this to be the first record for this species in Belmont County, and for the region as well.

Red-headed Woodpecker (*Melanerpes erythrocephalus*). This species is very common at Belmont Hills, nesting there each year. This seems surprising, since the same species rarely breeds in the West Virginia Panhandle, but thirteen miles away.

Yellow-bellied Flycatcher (*Empidonax flaviventris*). Seen on August 26. Probably a new record for Belmont County. Apparently an early migrant. Although I realize the difficulty in distinguishing between this species and the Acadian Flycatcher, I am positive this bird was a Yellow-bellied Flycatcher. At a distance of ten feet, we saw through 4x glasses the yellow throat, buffish-yellow breast and yellow belly. The bird was smaller than an Acadian Flycatcher.

Cliff Swallow (*Petrochelidon albifrons* subsp.). Two seen on August 26. This bird is considered a rare migrant in this region.—Thos. E. Shields, *Oglebay Park, Wheeling, W. Va.*

Some Bird Tragedies.—In the spring of 1924, while passing a nest of my favorite bird, the Meadowlark (*Sturnella magna magna*), I noticed a common Hog-nosed Snake (*Heterodon platyrhinus*) with a six-inch distention in the center of the body. Picking the reptile up and giving it a number of shakes caused it to regurgitate three young Meadowlarks. Last spring on one of my nature rambles at West Point, Illinois, my attention was drawn to the nest of a pair of House Wrens (*Troglodytes aëdon aëdon*) by the alarm notes of the owners. Upon making an investigation I found it necessary to remove a Garter Snake (*Thamnophis sirtalis*) from the nest, while the process of digesting five young wrens continued uninterrupted.

The following casualties may also interest my readers. As a Mallard (*Anas p. platyrhynchos*) duckling floated near my place of concealment, it failed under the guidance of its mother to escape being captured by a Cooper's Hawk (*Accipiter cooperi*) that dropped from above and snatched it from the surface of the

water. A Killdeer (*Oxyechus v. vociferus*) feeding under my observation was instantly killed when it ran its head into a steel trap that some trapper had placed along the shore of a small stream and failed to recover. A brood of Phoebes (*Sayornis phoebe*) that I had banded, after being tortured in an insect-infested nest, leaped to their watery grave below. Mr. Charles Guthrie of West Point, Illinois, told me that he placed a cover on a chimney at his home one spring and the following September removed it and found the skeletons of several Chimney Swifts (*Chaetura pelagica*) in the chimney well. Mr. Nor Roe of Dallas City, Illinois, informs me that a Robin (*Turdus migratorius*) last spring flew into a window at his home. Upon questioning Mr. Roe I learned that a shade had been pulled down, forming a mirror in which the bird saw its image. A Chimney Swift which had been banded (No. 687741) by me at West Point, Illinois, on September 9, 1932, was killed when it struck a wire near Stillwell, Illinois, on May 18, 1933. Stillwell is a little more than two miles from the place where the bird was banded.—LAWRENCE E. HUNTER, *Dallas City, Ill.*

Migration of Hawks in Wisconsin.—Supplementing the article by Ralph Beebe, "Influence of the Great Lakes on the Migration of Birds" (WILSON BULLETIN, XLV, No. 3, p. 118), the following notations may be of interest. Similar observations of bird migrations have been carried on rather intensively by a group of Milwaukee ornithologists since 1921 at the mouth of Bar Creek, Sheboygan County, Wisconsin, about forty miles north of Milwaukee.

Mr. Beebe indicates that the flight of raptors is well developed at Whitefish Point on Lake Superior and crosses Northern Michigan through Luce and Schoolcraft Counties to follow the north and west shore of Lake Michigan. Personal observation shows the route to continue through Door County, Wisconsin, and along the shore so that as far south as the vicinity of Bar Creek it is very narrowly defined in an air highway from a quarter to half a mile wide.

At Bar Creek the flight of raptors is sometimes most spectacular. On numerous occasions censuses of hawks have been made of which the following notes are examples:

September 25, 1921. H. L. Stoddard and the writer took counts of the number of hawks passing a certain point for five-minute periods. Eight such counts were made during the day and the average number of birds per hour calculated. A reasonably conservative estimate indicated that 2,040 hawks passed between 8:00 A. M. and 4:00 P. M. These were largely Sharp-shinned Hawks and Cooper's Hawks, although nine species were listed.

November 2, 1924. With L. Friedman, the writer noted approximately 300 hawks, mainly Buteo, seen from 7:30 A. M to 11:30 A. M. Ten species were listed.

September 28, 1930. Flight of hawks, mainly Broad-winged, but including thirteen species of raptors. Four counts for fifteen-minute periods during the day, averaged, gave a very conservative estimate of 5,280 birds passing a given point.

October 1, 1933. M. Deusing, O. J. Gromme, and the writer made an approximate count of 2,200 migrating hawks. Twelve species were noted.

These are fair indications of the number of birds that pass at this point along the west shore of Lake Michigan. Hawks drift through from September 10 to November 5 and of course vary in abundance from year to year. Two or three miles back from the lake, the flight is practically absent, indicating how narrow and well defined the lane of flight is.

The migration of hawks has been seen in the city of Milwaukee along the bluffs that form the water front. In flights over the city it has been observed that the raptors travel at a great height (800 to 1,500 feet I should judge). The direction of flight south from the city has not been ascertained by observation.

Abundance of hawks in migration seems directly related to the movement of passerine birds. When there is a concentrated migration of warblers and sparrows, it is a corollary that a fine flight of raptors may be expected.—CLARENCE S. JUNG, *Milwaukee, Wis.*

The Louisiana Paroquet in Ohio, Kentucky, and Indiana.—Recently, Mr. Charles C. Deam of Bluffton, Indiana, loaned the writer a copy of a very rare publication by David Thomas entitled, "Travels through the Western Country in the Summer of 1816". This book was published in 1819 by David Rumsey, Auburn, New York, and is the diary of a journey through the western parts of New York and Pennsylvania, the northern projection of Virginia (now West Virginia), the southern part of Ohio, the northern part of Kentucky, and the interior and western parts of Indiana. It is carefully and authoritatively written, and the broad interests and training of the author are shown by the space devoted to the botany, zoology, geography, geology, industry, and agriculture of the regions visited. Many bird species are mentioned, especially the now extinct Louisiana Paroquet (which of course was then known as the Carolina Paroquet). As these references are not readily accessible and have apparently been lost to the ornithological world, the most important notes are quoted below.

Thomas speaks of seeing wild "parroquets" in Kentucky shortly after leaving Cincinnati. He writes: "These birds, which are about the size of wild pigeons, are also sometimes seen on the Miami." A footnote adds, "Drake says on the Scioto." (Both of these streams are in Ohio). On the banks of Indian Creek, Kentucky, he writes: "On the approach of any large bird the Parroquets immediately commence flying round and round in flocks, screaming most hideously. In this way they escape the hawks."

Forty miles west of Louisville, in the state of Indiana, Thomas writes: "The parroquet commits depredations on the wheat in harvest, but it is a bird of uncommon beauty. The head is red, the neck yellow, and the body a light green." Again at French Lick, Indiana, he writes: "This place is the favorite residence of the parroquet, flocks of which are continually flying around. These birds seem to delight in screaming."

North of Vincennes, Indiana, Thomas mentions parroquets eating boring insects of cottonwood trees, "To procure this food, the parroquets have been busily employed, at times, through the day: but though they have become so familiar: and though they excel all the birds of this country in beauty of plumage, their scream is so discordant, and their fierceness of disposition so apparent, as to preclude every sensation of attachment. These birds build their nests in hollow trees. The strength of their necks is remarkable: and we are assured that when both wings and feet are tied, they can climb trees by striking their bills into the bark."

A quotation is also given from an old "Topographical Description of the State of Ohio", as follows: "The green parroquet with a yellow crown, a species of parrot, is very common. It has a harsh, unpleasant note, and although easily tamed, it cannot be taught to imitate the human voice. The habits of these birds in some respects are singular. They are always seen in flocks, which retire at

night in hollow trees, where they suspend themselves by their bills. These birds also retreat to hollow trees in winter. There have been found, after a severe winter, prodigious numbers in a large tree, filling the whole cavity, where they had perished by the severity of the cold."—LAWRENCE E. HICKS, *Ohio State University, Columbus, Ohio.*

Notes on a Hand-reared Flicker.—What bird lover does not revel in the joy of close contact with his feathered friends, when a bond of sympathy is developed between them, so that the bird will perch on his finger or shoulder? An even greater joy comes to him who has had the privilege of being a foster parent to some baby bird, watching it from day to day, growing from helpless babyhood to adult proportions and plumage, to have that bird's affection for him become so firmly fixed that when adult it continues to return to him as its foster parent for food, drink, and attention.

We have had this joy this summer (1934) with a Northern Flicker, which we called Chee-Chee. In years past we have raised many nestlings and fledglings of such birds as Eastern Robins, sparrows, and pheasants, such being merely a matter of patience and the selecting of the proper food. But when one considers that the mother flicker eats her food, digests it, and then regurgitates the same to feed her babies, the hand raising of a young flicker is an entirely different matter. So when this unfortunate orphan came into our possession we were at our wit's end as to the proper method of procedure. Shredded wheat softened in boiling milk was added to the yolk of a hard-boiled egg; this was triturated and then dried ant's eggs and insects, in conjunction with cod liver oil, were added. The mixture might have been said to be about like pie dough in consistency. Pellets of this were pushed down the baby's throat, followed by seedless grapes or raspberries as dessert. I greatly feared rickets, or some other disease, due to malnutrition, but to our great surprise and delight the baby flicker grew and developed beautifully.

His first home was a box, in which he nestled in tissue paper and soft c'oths. It was amusing to see him peep out from under the cloth, as he would raise himself on his weak and wobbly legs, and complacently watch us moving about the room, or the dogs on the floor. After a few days he would slip from under the cloth, climb to the edge of the box, and balance himself there. Shortly after this, he would climb up the curtain and perch on the curtain rod above the window. A perch was made for him, of old branches fastened to a base, on which he could climb about. In a few weeks the porch afforded abundant place to practice climbing. On rainy days lace curtains indoors served the same purpose; or if he had flown to the floor, anybody convenient served as a tree, and up he would come in a hurry. When the drumming instinct first manifested itself, our heads, ears, and spectacles were used indiscriminately. This is a sensation which cannot adequately be described.

The dogs he never minded, when on the floor, allowing them to come right up to him, and sniff at him as much as they wished, with no resentment on his part. But Chee-Chee did not like the parrot, which would fly down at him when he was on the floor. This invariably precipitated a fight. The belligerents were separated at once, and so no harm was really inflicted. It was after one of these impromptu battles that I felt Chee-Chee would probably prefer having his freedom, for he was absolutely fearless and seemed able to give a good account of himself. So I took him out into the garden, set him on the edge of a bird bath,

and away he flew into a cherry tree. Apparently he had a good time climbing up and down the main trunk (his first real tree) and flitting about the branches. An hour and a half later he began to call lustily for help. Evidently he had become very hungry, and possibly tired, too. On going to the tree, he scrambled down far enough so I could reach him, when he was taken indoors and fed. He seemed very tired after this excursion, and was content to remain indoors the balance of the day.

On the following day he was very anxious to get out of doors again, so we liberated him a second time. As on the first day, an hour and a half seemed to satisfy him, and he called to be taken in. But the garden was full of clothes drying and fluttering in the sun. Evidently this was a fearful spectacle when viewed from a tree top, so he would not come down the tree where we could reach him. Finally Islay put up a twenty-foot ladder, and was barely able to reach him from the upper rung.

On the third day Chee-Chee made no attempt to get out until in the evening. As he had returned so nicely on the previous days, we turned him out without any hesitancy, but to our great dismay, just about dusk, he flew across the street, crossing telephone and trolley wires. Islay followed him, calling repeatedly, until she lost sight of him in the woods beyond. That was a sad and disconsolate night, for we were thoroughly convinced that we would never see Chee-Chee again, as we thought that on awakening in the morning he would find himself in a strange environment, the houses on the other side of the street being grouped differently and the trees also being different; all told, a new place. But at 5:30 the following morning, he was in the ash tree adjoining Grandma's room, calling lustily for breakfast. What was to be done? Grandma hurried down stairs, stepped into the garden, called "Chee, Chee, Chee", and with a rush he alighted on her shoulder. He had tested his strength and courage, and was absolutely sure of himself.

Since then he has never been confined indoors, only for such periods of time as were of his own choosing. Sometimes after a meal he rests for an hour or longer, preening his feathers, stretching his wings, talking to us, or quietly to himself, or tucking his head under his wing and taking a real nap, and then flying away at his own discretion. He usually returns about six times a day for his meals, announcing his return from either tree or cornice by calling until somebody goes out to get him. He flies down on to one's shoulders, or low down on a tree where he can be easily reached, or onto the fence posts. Frequently he clings to the screen, from whence he steps onto a proffered hand or finger. Lately, on hearing him, we merely open the screen door. Then he may fly directly into the kitchen and alight on his perch; or he may alight on the parrot's perch on the porch, which immediately starts belligerency on the part of the parrot, who climbs after Chee-Chee as rapidly as he can. Chee-Chee hurriedly scampers up the longest branch, which projects into the kitchen, when with a single bound he alights on his perch, half way across the room. Some times he makes a longer detour, flying through the breakfast room, and thence into the kitchen. Some days he hops the entire way up the four steps onto the porch, across the floor of the porch and breakfast room, into the kitchen, and then allows himself to be picked up.

While being fed he carries on a rapid-fire conversation, which is continued during the entire feeding time. He sips water from a cup, when it is presented

to him. At times he takes one or two sips, but sometimes as many as nineteen. He likes cocoa, too, sitting on my arm, from which point he can easily reach my cup. Feeding is still done in the same fashion as when he was a tiny baby; the food must be pushed down into his throat, he making absolutely no attempt to help himself. When fully satisfied he flies to the shoulder of the person feeding him, thence out through the window, or around by way of the breakfast room, and on to the porch, clinging to the screen until the door is opened for him, and away he soars into the trees. This performance is varied at times, when he deliberately allows himself to be carried out of doors, making no attempt to fly until on the outside. Not always does he fly away promptly, but he will sometimes perch on the hand before leaving, and administer a few vigorous whacks on the fingers with his powerful beak. Apparently it is a form of play. Oftimes he comes home with his long beak coated with dry mud, evidently having been digging ants in wet ground. And even his feet may be caked with mud. But a wet cloth soon restores them to perfect cleanliness. This cleaning process has never been resented in the least.

One day while sipping water he acted as if he wanted to bathe, so Grandma carried him to one of the bird baths, and gently put him down into the water. On releasing him, he had a most wonderful bath. Finally, he flew into a tree to preen his feathers, and then flew down into the lawn, where he lay with outstretched wings until dry. Some weeks ago he made more than his usual noise on coming home, and there he was, in the top of an enormous tree, with three rollicking companions. Grandma called him, and two of his companions flew away, but Chee-Chee and one other flew into our own garden, and then he individually flew down onto his beloved shoulder, whence he was taken indoors, fed, and flew back into the tree where his chum was still waiting for him. The thrill of this wild creature coming back repeatedly to be fed, taken indoors, fussed over, talked to, and to fly out again at his pleasure, is indescribable. We have never experienced anything quite like it. We dread the onset of autumn, fearing he may respond to the great spirit of migration, and leave us for the sunny and genial South. And yet, he may do like a Robin we had years ago, that returned to us for three successive springs.—Dr. G. A. Hinnen, *Mt. Lookout, Cincinnati, O.*

The Incubation Period of the Sora Rail.—In searching through the literature of ornithology I find no definite incubation period given for the Sora Rail (*Porzana carolina*). Having made many observations of this species during the nesting season, I have had the good fortune of following three nests from the beginning of incubation on through hatching, and wish to publish these records.

The first of these nests was found May 10, 1920, at Bellevue, Eaton County, Michigan, when it contained four eggs. The set was completed on May 15, when it contained nine eggs. The period from then to May 31, when the last egg hatched, would be the incubation period for that certain egg, which would be sixteen days. The eggs hatched from May 29 to May 31, indicating that incubation began at least two days before the last egg was laid.

The second nest was found on May 11, 1930, in Convis Township, Calhoun County, Michigan. It contained four eggs and the female was flushed from the nest, even though it was during the middle of the afternoon. This set was complete on May 17, when it contained ten eggs, and these hatched from June 1 to June 3. The period of incubation for the last egg in this case was seventeen days.

The third nest of this group was found May 10, 1934, when it contained seven eggs, in Convis Township, Calhoun County, Michigan. The nest contained a complete set of nine eggs on May 12. When visited on May 27 it contained five downy young, two of which were still wet, and four eggs. Since this was early in the morning probably one or two of these had hatched on the previous day. The other four eggs probably hatched that day and the day following, May 28. This would make a period of sixteen days between the laying and hatching of the last egg.

In the case of the second nest, if the bird had commenced incubation when she was flushed from the four eggs the incubation period for these eggs would be about twenty-one days. In the case of the fifth egg in the third nest, assuming the bird to lay one egg each day, it would have been deposited on May 8 and hatched on May 27, a period of nineteen days. Since the bird was sitting when the nest was found, when it contained only seven eggs it is hard to state just when incubation began, but the incubation period for that certain egg would be from seventeen to nineteen days.

In the three nests the eggs hatched in each case over a period of three days and there was a similarity in the number of days incubated for the last egg laid, either sixteen or seventeen days. The incubation period for the Sora Rail with the birds incubating could be stated as being sixteen or seventeen days, with the possibility that some of the eggs required two or three days longer.—LAWRENCE H. WALKINSHAW, *Battle Creek, Mich.*

The Golden-winged Warbler in South Dakota.—The following are the four known records of the Golden-winged Warbler (*Vermivora chrysoptera*) in South Dakota: (1). A mounted specimen of an adult male is in the Henderson Natural History Museum at Redfield, South Dakota. The label bears no date, but this specimen was taken in South Dakota a number of years ago. (2). On September 7, 1931, Dr. Brenkle placed band No. F18828 on a female or immature at Northville, South Dakota. This individual returned to the water trap on September 9, 1931. (3). On May 10, 1933, the late Mr. E. C. Anderson collected a male at Dell Rapids, South Dakota. The specimen was identified by Dr. T. C. Stephens of Sioux City, Iowa. The skin is now in the South Dakota State University Museum at Vermillion, South Dakota (WILSON BULLETIN, XLV, December, 1933, pp. 197-198). (4). On September 11, 1933, the writer banded with band No. L21404 an adult male at Northville, South Dakota. Further records of this species in South Dakota will be appreciated by the writer.—PAUL R. THOMPSON, *Northville, S. Dak.*

PROCEEDINGS OF THE WILSON ORNITHOLOGICAL CLUB

By Lawrence E. Hicks, Secretary

The Twentieth Annual Meeting of the Wilson Ornithological Club was held at Pittsburgh, Pennsylvania, on December 28-29-30, 1935, in connection with many other organizations affiliated with the American Association for the Advancement of Science. The business and program sessions were held in the Lecture Hall of the Carnegie Museum. Short business sessions were held Friday and Saturday mornings. The four program sessions Friday and Saturday, morning and afternoon, included thirty-nine papers, slide talks, and movie presentations. The maximum attendance at each session was 86, 103, 96, and 87.

Friday evening the Wilson Ornithological Club Annual Dinner was held at the University Club in conjunction with the dinner of the American Society of Zoologists. Many in attendance were members of both organizations. No exact check could be made on the attendance but at least seventy-two Wilson Ornithological Club members were present. President Shaver represented the W. O. C. on the program. The feature address of the evening was given by Dr. George L. Streeter of the Carnegie Foundation. Following the dinner, all botanists and zoologists attending the meeting joined in the Biologists' Smoker, an important event of the annual A. A. A. S. conventions.

Saturday evening eighty-two members and friends attended a most enjoyable open house and reception in the research laboratories of the Museum. This fine event was made possible through the courtesy and planning of the Carnegie Museum, the Museum Staff, and the Local Committee composed of W. E. Clyde Todd, Bayard H. Christy, Sidney K. Eastwood, Charles Agostini, J. Warren Jacobs, and John W. Handlan. The evening was spent viewing parts of the museum study collection of 110,000 bird skins, the library and research facilities, and the distribution maps of Pennsylvania birds. The session was terminated by the viewing of three reels of splendid movie films depicting the nature study educational values of "The Birds and Animal Life of Frick Park". These were presented by Mr. H. S. Crass, Supervisor of Frick Park.

Sunday morning a number of members joined a party of local observers on a field trip to Frick Park, observing some of the wild birds and mammals there which become remarkably tame through feeding and protection.

Exhibits

Another outstanding feature of the annual meeting was a splendid exhibit of Wilsoniana assembled largely through the efforts of Mr. Bayard H. Christy of the Local Committee. This was made possible through the coöperation of a number of individuals and the Harvard Museum of Comparative Zoology, Dr. Thomas Barbour, Director, who loaned exhibit material. The exhibit included manuscripts, drawings, mounted birds, prints of engravings, books, personal effects, and portraits, in such variety and quantity as to picture to the mind's eye the circumstances under which Wilson's great Ornithology was projected and carried through to accomplishment.

The most notable items in the exhibition came from the Thayer collection, and were generously loaned by the Museum of Comparative Zoology in Cambridge, Massachusetts. Dr. Witmer Stone, of Philadelphia, kindly contributed a long and interesting letter and a number of engraved portraits as well. Mr. Strickland Kneass, Jr., of Sewickley, loaned an autographed book. Mr. Bayard

H. Christy's collection of Wilson's published works was displayed, with supplementary material loaned by Mrs. Tracy W. Guthrie, of Edgeworth, and by Miss Phoebe Knappen, of Washington, D. C.

Other items exhibited were four of Wilson's letters, a receipt book of Wilson's, the gun which he used in collecting, each edition of his books published, and six water color and one pen and pencil drawing—the originals made by Wilson for the plates of his book.

There were probably few present who viewed these exhibits of the man who has long given both his name and his inspiration to the Wilson Ornithological Club, but that shared the ideas expressed by Mr. Bayard H. Christy in commenting on the exhibit: "These many and various articles, that taken singly are slight and insignificant, possess in the aggregate a surprising evocative power. We are dazzled by the products of mechanical processes of today—by the thousand-fold abundance of facile achievement. But for all their achievement these modern men have not caused us to overlook nor to forget the patient, plodding, loving work of Alexander Wilson. As one looks and meditates, the years between slip away: the objects themselves become instinct with the spirit of the man. It is as though he had but yesterday wrested them from his hand. And they are eloquent of a careful, painstaking, intelligent worker, master of himself, master of what he was doing. We begin to look upon him as we conceive his associates looked upon him, to take satisfaction as they must have taken satisfaction, and to feel the shock and keenness of their regret that the stroke of death should fall when the great undertaking was at the very point of completion."

Attendance

The 1934 meeting was one of the largest and most successful in the history of the organization. The total registration was 178 but a considerable number, mostly local visitors, failed to register. However, records available would indicate that in spite of the small local attendance (49), that the Pittsburgh meeting ranks second only to the Des Moines meeting in total registration, and ranks first in the history of the organization in the number of out-of-town visitors registered (129).

Seventeen colleges and universities, and ten museums and other institutions, were represented in the attendance at the Pittsburgh Meeting. These included: Carnegie Institute of Technology, Columbia University, Cornell University, George Peabody College for Teachers, Morningside College, North Carolina College for Women, North Carolina State College, Otterbein College, Ohio State University, Pennsylvania State College, Slippery Rock College, University of Illinois, University of Michigan, University of Pittsburg, University of West Virginia, Western Reserve University, Wooster College, Carnegie Museum, Emergency Conservation Committee, Hawk and Owl Society, National Association of Audubon Societies, Ohio Division of Conservation, Ohio State Museum, United States Biological Survey, Department of the Interior, Soil Erosion Service, and National Park Service.

Business Sessions

Short business sessions were held Friday and Saturday mornings, President Shaver presiding.

The minutes of the 1932 meeting were approved without being read, since they had previously been published in the Wilson Bulletin (Vol. XLV, No. 1, pp. 37-50). The Secretary's and Treasurer's reports for the year 1933 were ap-

proved as published in the WILSON BULLETIN (Vol. XLVI, No. 1, pp. 67-69). The Secretary's and Treasurer's reports for the year 1934 were also approved. The Secretary's report indicated that during the past year thirty-five members had assisted in the membership campaign by making nominations resulting in the securing of one or more members each. In spite of these additions, a small decrease in the total number of members was reported. A list was presented of the 114 new members secured in 1933 and of the 112 new members secured during 1934, and previously confirmed by the electoral board. These were elected to membership.

The Secretary also presented a list of 128 members from thirty-eight states, each of which, though unable to attend the Pittsburgh Meeting, had written a letter acknowledging the meeting notice, expressing regret at being unable to attend, and sending best wishes for the success of the meeting. The receipt of so many unsolicited letters indicates that the great bulk of the Wilson Ornithological Club membership consists of persons actively interested in furthering the ornithological studies and the educational and conservation work sponsored by the organization. The Secretary expressed his thanks for the many encouraging and stimulating news letters received from the members throughout the year, and voiced his regret at being unable to reply except by brief delayed notes or through the pages of the WILSON BULLETIN.

The Editor presented a carefully detailed report, including tables indicating the cost of each item involved in the total cost of each issue of the WILSON BULLETIN. The report was too lengthy to be read in its entirety, so was summarized and made available for examination. Its examination enabled the members present to appreciate the demands made upon the time and energy of the Editor in assembling the four issues of the WILSON BULLETIN each year. In the absence of the Treasurer, his report was summarized, made available for examination, and at the Saturday session was adopted upon recommendation of the Auditing Committee.

The following temporary committees were appointed by the President: Nominations, T. C. Stephens, W. E. Clyde Todd, and Mrs. Margaret M. Nice; Resolutions and Amendments, Albert F. Ganier, F. N. Blanchard, and F. L. Fitzpatrick; Auditing, Chas. J. Spiker and Bayard H. Christy.

The Committee on Resolutions offered the following resolutions, all of which were adopted by motion:

Resolved, that the Wilson Ornithological Club commends the National Association of Audubon Societies for the educational campaign it has launched in the interest of beneficial hawks and owls of North America.

Resolved, that the Wilson Ornithological Club hereby expresses its approval and commendation on the acquisition of Hawk Mountain in Pennsylvania by the Emergency Conservation Committee, and hopes that it may become a permanent sanctuary for wild life.

Resolved, that the Wilson Ornithological Club, at this concluding point of a most successful meeting at Pittsburgh, desires to express its appreciation and gratitude to—

The Carnegie Museum and its Director, Dr. A. Avinoff, for placing the splendid facilities of this institution at our disposal for these sessions.

The Ornithological Staff of the Museum for their many courtesies and constant attention to the details of the occasion.

The Local Committee of Arrangements, which, under the chairmanship of Mr. W. E. Clyde Todd, planned the meeting and coördinated it with other zoological meetings.

Mr. Bayard H. Christy for assembling the interesting collection of Wilsoniana, and those who kindly loaned articles for the exhibit.

The Officers of the W. O. C., especially the Secretary, Treasurer, and Editor, for the considerable amount of time and talent which they have generously given to the Club during the past year.

The Committee on Nominations offered the following report:

President—Josselyn Van Tyne, University of Michigan, Ann Arbor, Michigan.
First Vice-President—Alfred M. Bailey, Chicago Academy of Sciences, Chicago, Illinois.
Second Vice-President—Margaret M. Nice, Columbus, Ohio.
Secretary—Lawrence E. Hicks, Ohio State University, Columbus, Ohio.
Treasurer—W. M. Rosene, Ogden, Iowa.
Councillors—Albert F. Ganier, Nashville, Tennessee.
Lynds Jones, Oberlin, Ohio.
Myron H. Swenk, Lincoln, Nebraska.

The report was adopted by motion, and the Secretary was instructed to cast the unanimous ballot for the nominees. This being done all were declared elected for the ensuing year. The session then adjourned *sine die*.

Communications

December 27, 1934.

To Lawrence E. Hicks,
Secretary of the Wilson Ornithological Club:

Greetings from the A. O. U. and best wishes for a successful meeting of the Wilson Ornithological Club. I only regret that I can not be with you in Pittsburgh.

Very cordially yours,
T. S. Palmer, *Secretary A. O. U.*

Program of Papers

The Friday morning session began with an address of welcome by Dr. A. Avinoff, Director of the Carnegie Museum, to which President Shaver responded.

The papers as presented, with brief abstracts, are given below, varying slightly in sequence from that announced for the meeting. All meetings were held in the Lecture Hall of the Carnegie Museum.

Friday Morning Session

1. The Eighth International Ornithological Congress at Oxford. (15 minutes). Margaret M. Nice, Columbus, Ohio.

   An account of this notable meeting, telling of the papers dealing with the study of the live bird, of the brilliant social occasions, and of the memorable trip to the bird islands off the coast of Wales.

2. Bilateral and Unilateral Ovaries in Raptorial Birds. (15 minutes). Fred L. Fitzpatrick, Columbia University, New York City.

   Dissection of adult female owls reveals only unilateral development of the ovaries, the right ovary apparently never occurring as an adult structure. In many species of hawks, however, both in Europe and America, several sources suggest that bilateral ovaries are the rule in early embryonic development, and that in adults of some species both ovaries persist, the right often considerably smaller than the left.

3. Hawk Mountain. (10 minutes). Mrs. Charles N. Edge, Emergency Conservation Committee, New York, N. Y.

   Hawk Mountain, a peak of the Kittatinny Mountains of Pennsylvania, lying between Hamburg and Pottsville, is a concentration point for many birds of prey which in migration follow this ridge of the Appalachians. Here for several decades hunters have slaughtered several thousand birds annually. During the summer of 1934 the Emergency Conservation Committee was successful in leasing the mountain and engaged Maurice Broun as ornithologist-guardian of the area. Strenuous efforts were successful in eliminating all shooting. It is planned to purchase the area and provide it with sufficient endowment to insure its preservation as a perpetual wild life sanctuary. More than 10,000 birds of prey were counted passing the mountain during the fall of 1934. These were of great interest to bird students and included the following species: Vultures, 166; Eastern Goshawk, 125; Sharp-shinned Hawk, 1913; Cooper's Hawk, 333; Eastern Red-tailed Hawk, 5609; Eastern Red-shouldered Hawk, 90; Broad-winged Hawk, 2026; Rough-legged Hawk, 20; Golden Eagle, 39; Bald Eagle, 52; Marsh Hawk, 105; Osprey, 31; White Gyrfalcon, 1; Black Gyrfalcon, 2; Duck Hawk, 25; Pigeon Hawk, 19; Sparrow Hawk, 13.

4. Ornithological Activities of the E. C. W. Program in Our National Parks. (20 minutes). Chas. J. Spiker, Naturalist-Technician for the National Parks East of the Mississippi, Washington, D. C.

   This paper summarized the new species of birds added by park naturalists to the published lists of birds for their respective areas and reviewed the efforts being made to give special protection and encouragement to the species already present. Water conservation, grazing restrictions, and extension of park boundaries were methods used to accomplish bird conservation measures.

5. Bird Cases and Specimens for Educational Uses in Schools. (10 minutes). Reinhold L. Fricke, Department of Education, Carnegie Museum, Pittsburgh, Pa.

   An informal discussion of the preparation and use of portable school exhibits of birds, illustrated with examples of birdskins in glass tubes and various types of cases. A part of the cases are family groups of individual mounts, and others are habitat groups with photographic backgrounds portraying a pair of birds with their nest and eggs.

6. Report on the John B. Semple Expedition (1934) to British Columbia. (20 minutes). George M. Sutton, Cornell University, Ithaca, N. Y.

   The expedition made many ornithological finds in this region of beautiful, unexplored wilderness. The Black Pigeon Hawk was collected on its breeding territory and reports were received of Trumpeter Swans occurring in numbers. It was also found that traders in British Columbia were encouraging the Indians to kill Eagles by offering rewards of $2.50 for the wings and tail of each bird. This plumage was later sold at a handsome profit to Indians in the southwest, especially to the Hopis and the Indians of the Plains, and sometimes brought as much as $1.00 per feather.

7. Notes on the Life of Alexander Wilson. (20 minutes). Gordon Wilson, Teachers College, Bowling Green, Ky. Read by Bayard H. Christy, Sewickley, Pa., with additional comments on the Wilsoniana Exhibit.

8. An Experiment in Bird Study in West Virginia. (15 minutes). John W. Handlan, Wheeling, W. Va.

   The city of Wheeling, West Virginia, owns a 750-acre public property known as Oglebay Park. The public is invited to meet here each Sunday morning the park naturalist for a conducted nature field trip covering two miles or more of the Park's eleven-mile chain of trails. The success of this fine educational work in natural history is attested by the fact that more than 50,000 people have taken these "bird walks" during the past seven years, with

an average attendance of 115 on each trip. The chief leader of these trips has been A. B. Brooks, Park Naturalist. The interest aroused led to the formation in 1932 of the Brooks Bird Club which now publishes the *Redstart*, sponsors a broad program in the interests of ornithological education, and has been instrumental in the formation of several bird study clubs in the West Virginia region.

9. A Study of the Savannah Sparrow in West Virginia. (20 minutes). Thomas E. Shields, Wheeling, W. Va.

Field work done in 1933 and 1934 indicated that the species breeds regularly in the panhandle counties of West Virginia, though uncommon and quite local. Several nests found were studied in detail. All nesting records to date were at altitudes exceeding 1175 feet.

FRIDAY AFTERNOON SESSION

10. The European Starling as a Banding and Research Subject. (15 minutes). Lawrence E. Hicks, Ohio State University, Columbus, Ohio.

The study of 52,000 Starlings captured in central Ohio, of 33,000 banded, and of more than 8,000 used as specimens, emphasizes how much may yet be learned of the fundamentals of bird life by using these easily procured birds as "Guinea Pigs" in ornithological investigations. We have the unusual opportunity of being able to study an introduced migratory species and can work with the large numbers necessary to answer many perplexing questions. It was strongly urged that ornithologists report on the sex ratios found at each season in flocks of Starlings of their home areas.

11. Bird Collections in the Carnegie Museum. (15 minutes). Ruth Trimble, Carnegie Museum, Pittsburgh, Pa.

A brief account of the history and scope of the Carnegie Museum's study collection of birds, which consists of approximately 110,000 specimens, and is the fourth largest collection in North America.

12. Six Years' Records on the Singing of One Song Sparrow. (15 minutes). Margaret M. Nice, Columbus, Ohio.

A male studied (4M) starts his awakening song in the morning at about 0.2 foot candles of light, which in clear weather occurs about one-half hour before sunrise. He sings from eight to nine months each year. He had nine songs in his repertoire from 1929 to 1934. During four autumns he started singing between September 28 and 30, but in 1929 began on September 10.

13. Protocalliphora as Parasites of Birds. (10 minutes). Edward S. Thomas, Ohio State Museum, Columbus, Ohio.

A review was made of the literature relating to these nest parasites. Dr. Plath reported 61 per cent of the nests of ten species were parasitized, an average of thirty-six larvae per infested nest and 5 to 10 per cent or more of the nestlings killed. Three species of this blowfly are known from North America and are recorded as parasitizing no less than thirty-six bird species. A wasp-like chalcid fly parasitizes this parasite. In Ohio many infested nests have been found recently of bluebirds and several species of sparrows and warblers.

14. Twenty-four Hours in the Kirtland Warbler Country. (10 minutes). William C. Baker, Salem, Ohio.

Trips to Crawford County, Michigan, in 1933 and 1934, resulted not only in the finding of the nest of the Kirtland's Warbler, but of many other species. A total of ninety-two breeding species were recorded for the region.

15. The Effect of Light on the Reproduction and Growth of Chickens. (10 minutes). (Lantern). E. L. Dakan, Poultry Department, Ohio State University, Columbus, Ohio.

16. Methods for Studying the Abundance of Birds. (20 minutes). S. Charles Kendeigh, Biological Laboratory, Western Reserve University, Cleveland, Ohio.

Various methods exist for determining the relative and absolute abundance of non-game birds. Nesting and banding censuses appear the most reliable, as demonstrated by fourteen years records of the abundance of the Eastern House Wren (*Troglodytes a. aëdon*). To analyze the factors affecting yearly fluctuations in numbers, amount of reproduction, and survival over winter must be considered separately. Both biological and climatic factors have been found important, with the former more significant in controlling reproduction and the latter in determining survival.

17. The Harris's Sparrow's Eggs and the 1931 Ornithological Expedition to Churchill, Manitoba. (40 minutes). (Lantern). George M. Sutton, Cornell University, Ithaca, N. Y.

A report of the findings of the first nests of the Harris's Sparrow and beautifully colored slides showing the nests and adults of many species of sparrows, shorebirds, gulls, and warblers.

SATURDAY MORNING SESSION

18. A Preliminary Report on the Breeding Birds of Columbiana County, Ohio. (25 minutes). William C. Baker, Salem, Ohio.

Columbiana County is the southernmost of the eastern tier of Ohio counties, being on the glacial boundary. The breeding of 121 species has been established, nests of eighty-eight being found and small young of fifteen additional species. Several northern species reach their southern breeding limits in the county.

19. Distribution of Some of the 179 Species of Birds Known to Breed in Ohio. (15 minutes). (Lantern). Lawrence E. Hicks, Ohio State University, Columbus, Ohio.

Maps indicating distribution by townships were shown of some thirty species which reach their northern, southern, western, or eastern breeding limits in the state. Stress was placed upon the importance of securing exact detailed data on the present and past distribution of each breeding species. During the past twelve years a map has been prepared for each species on which has been plotted all known published or unpublished breeding data as contributed by most of the ornithologists of the state. It is hoped to soon make some of this information available in published form.

20. Local Distribution of Western Pennsylvania Birds. (20 minutes). (Lantern). W. E. Clyde Todd, Carnegie Museum, Pittsburgh, Pa.

Colored maps illustrating the breeding ranges of thirty species of birds in western Pennsylvania, were exhibited on the screen, with some remarks on each. The ranges as plotted show considerable variation affecting species supposed to belong to the same life zone.

21. Our Vanishing Raptors—A Conservation Problem. (30 minutes). (Lantern). Warren F. Eaton, Upper Montclair, N. J.

At least 75 per cent of the reports received on the numbers of hawks, eagles, kites, and owls, indicate decided increases due to changes in the natural environment or due to killing for sport, trophies, or so-called "vermin control". Unusual problems present themselves in attempting to save the remnant of our birds of prey population, but these must be surmounted or these economically and aesthetically valuable birds will disappear as have those of Europe.

22. Some Problems of a Teacher of Ornithology. (10 minutes). E. L. Dakan, Ohio State University, Columbus, Ohio.

A discussion in which the audience participated, as to the best procedures to follow in most effectively presenting ornithological education to university classes.

23. Food Habits of the Bald Eagle. (12 minutes). Frank R. Smith, Fredericktown, Pa.

A summary of the status of the Bald Eagle on the eastern shore of Maryland. The value of the eagle in removing diseased or wounded muskrats and

waterfowl was stressed. The eagles, now much reduced in numbers, destroy little of value and during the past forty years have not been known to molest lambs.

24. A Photo Record of Interesting Nest Sites. (12 minutes). (Lantern). A. B. Brooks, Wheeling, W. Va.

Photos of many odd nest locations, including several of robins located on railroad cars, the parent birds following the nests many miles to new locations or taking daily trips of several miles without deserting the nests.

SATURDAY AFTERNOON SESSION

25. The Beach-Combers of Lake Superior. (20 minutes). Bayard H. Christy, Sewickley, Pa.

An account of the shore birds and passerine birds which frequent the lake shore.

26. Blood Studies—the Number of Erythrocytes in Migrating Birds. (15 minutes). (Lantern). Leonard B. Nice, Department of Physiology, Ohio State University, Columbus, Ohio.

The number of red-blood corpuscles in White-throated and White-crowned Sparrows, Juncos, Song, Lincoln, Chipping, and Tree Sparrows, ranged between 4,846,000 and 5,702,000 per cubic millimeter of blood. Cardinals averaged 5,123,000, Tufted Titmice 4,368,000, Cowbirds, 6,055,000, and Bobwhites 3,532,000.

27. The Canadian Component of West Virginia Bird Life. (15 minutes). Maurice Brooks, Morgantown, W. Va.

A comparison was made of the bird life of the former West Virginia spruce belt as it is today, and as it was when Dr. W. C. Rives wrote of it thirty-six years ago, before the Spruce was cut. Twenty-three species definitely classed as Canadian in the Check-list were recorded as summer residents by Rives. Recent field work by the author of the paper disclosed that no species has been lost to the state, although some range restrictions have occurred. Several new breeding species have been added to the list by the recent work.

28. A Study of the Roosting Behavior of the European Starling. (12 minutes). (Lantern). Charles A. Dambach, Ohio State University, Columbus, Ohio.

A report of detailed observations on an outdoor roost of 32,000 birds located on a hillside oak thicket near Zanesville, Ohio, during the last five months of 1934.

29. A Survey of the Bald Eagles of the Lower Mississippi Valley. (20 minutes). (Lantern). Albert F. Ganier, Nashville, Tenn.

A large map was shown indicating the location of the nests of about thirty-five pairs of eagles studied in a strip of Mississippi bottomland several hundred miles in length.

30. The Comparative Ability of the Ring-necked Pheasant and the Bob-white Quail to withstand Cold and Hunger. Paul L. Errington, Iowa State College, Ames, Iowa. (Paper presented by Charles A. Dambach, Ohio State University, Columbus, Ohio).

The comparative experimental and observational data indicate that the pheasant is strikingly superior to the Bob-white in its ability to withstand cold when emaciated, to endure hunger, to retard starvation by feeding upon low quality herbaceous foods, and to regain lost weight quickly and far more completely when opportunity presents itself. Both species die of starvation when reduced down to about 57 per cent of their original normal body weight. No sexual differences in resistance were found for either species.

31. Action Scenes of Louisiana Marsh Birds. (45 minutes). (35 mm. motion pictures). Edward A. McIlhenny, Avery Island, La.

Five reels of films showing marsh birds, waterfowl, Snowy Egrets, Blue Geese, and other animal life of the swamps.

SATURDAY EVENING SESSION

32. The Bird and Animal Life of Frick Park, Pittsburgh. (3 reels of 16 mm motion pictures). H. S. Crass, Supervisor of Frick Park, Pittsburgh, Pa.

The following papers were read by title:

33. Recent Observations on the Waterfowl Supply Along the Atlantic Coast. (20 minutes). T. Gilbert Pearson, National Association of Audubon Societies, New York, N. Y.

34. Views of the Home Life of the Atlantic Murre. (20 minutes). Robert A. Johnson, Oneonta, N. Y.

35. Experiences with the Golden Plover and Other Rare Birds of Indiana. (22 minutes). Mrs. Horace F. Cook, Anderson, Ind.

36. The Relationship of the Great Black-backed Gull to Certain Other Species on the Nesting Grounds of Canadian Labrador. (25 minutes). (Lantern). Robert A. Johnson, Oneonta, N. Y.

37. Wild Life Cycles. (15 minutes). Leonard W. Wing, Madison, Wis.

38. Some Experiences of an Amateur with Birds in Canadian Labrador. (15 minutes). (16 mm. motion pictures). A. A. Myrus, Oneonta, N. Y.

39. Virginia Mountain Studies of the Blackburnian Warbler. (8 minutes). F. M. Jones, Abington, Va.

REPORT OF THE SECRETARY FOR 1934*

To the Officers and Members of the Wilson Ornithological Club:

During the past year, the intensive campaign for new members was continued by the Secretary, to aid in offsetting the membership and financial losses due to the prevailing economic conditions. The work was handicapped by the continued high postal rates, increased printing costs, and by the depression retrenchments which prevented dozens of interested prospects from affiliating with our organization. If the members of the Wilson Ornithological Club, during the coming year, make a special attempt to acquaint friends with the benefits of the organization and forward to the officers the names of all membership prospects, it is believed that the 1935 report will show a decided gain in the number of new members. And a little encouragement will induce many members to carry on in spite of difficulties.

The membership campaign was quite successful. In 1932, 113 new members were secured and in 1933, 114. During 1934, 112 new members were added to the rolls. These 112 new members were: Sustaining, 1; Active, 18; and Associate, 93. The new members were distributed through 34 states and provinces: Ohio, 15; Iowa, 11; Wisconsin, 10; West Virginia, 9; New York, 7; Illinois and Michigan, 6 each; Kentucky, Kansas, Minnesota, Missouri, North Dakota, and California, 3 each; New Jersey, Pennsylvania, South Dakota, Tennessee, Texas, Virginia, and Utah, 2 each; Arizona, Florida, Indiana, Louisiana, Maine, Manitoba, Massachusetts, Montana, New Mexico, Nevada, New Brunswick, Oklahoma, Oregon, and Saskatchewan, 1 each.

Disregarding some duplications in nominations, the various members responsible for the applications of new members, were as follows: Lawrence E. Hicks,

*Revised to the end of December, 1934.

86; T. C. Stephens, 7; John W. Handlan, 5; W. M. Rosene, Philip A. DuMont, Maurice Brooks, Mabel Slack, Frank N. Blanchard, and Brasher Bacon, 3 each; J. M. Shaver, Charles J. Spiker, Gordon Wilson, and Joseph W. Stack, 2 each; Paul Errington, Oscar M. Bryens, Albert F. Ganier, Thomas E. Shields, R. A. Johnson, J. Reeder, Lyndon L. Hargrave, William G. Fargo, Noel J. Williams, Margaret M. Nice, J. J. Murray, M. G. Lewis, Laidlaw Williams, J. E. Patterson, W. M. Dawley, O. A. Stevens, David Damon, Sidney K. Eastwood, Winton Weydemeyer, Donald W. Douglass, L. Irby Davis, and G. M. Cook, 1 each.

In spite of these increases, the Wilson Ornithological Club has had a slight decrease in net membership number, due to the large number of resignations and delinquencies for 1934 forced by present conditions. The total number of members lost during the year 1934 from all causes was 151, 1 being Honorary, 2 Sustaining, 37 Active, and 111 Associate. Thus, there has been a net loss of 39 members during 1934.

This leaves the present membership of the club at 621, distributed as follows: Honorary, 6; Life, 12 (2 are also Honorary); Sustaining, 44; Active, 154; Associate, 407.

The Secretary wishes to take this opportunity to thank the many members who have assisted in the membership campaign, helped with the staging of the annual meeting, or otherwise advanced the work of the Wilson Ornithological Club during the past year. It has been particularly gratifying to have received in all nearly 300 letters from the members giving news of their own work, ideas and suggestions on ornithological topics, or words of encouragement and constructive criticisms of the work being done. It is greatly regretted that the pressure of other duties has made it impossible to answer many of these directly, or to reply except by abbreviated note.

Respectfully submitted,

LAWRENCE E. HICKS, *Secretary.*

REGISTER OF ATTENDANCE AT THE PITTSBURGH MEETING

From CANADA: Arthur C. Twomey, Camrose, Alberta. From ILLINOIS: Victor E. Shelford, Champaign; L. G. Browman, L. V. Domm, Robert Redfield, Mandel Sherman, Chicago; Helen Jacobs, Mrs. A. C. Twomey, Urbana. From INDIANA: Martha B. Lyon, M. W. Lyon, Jr., South Bend. From IOWA: T. C. Stephens, Sioux City. From MASSACHUSETTS: Harry D. Eastman, Sherborn; K. L. Hussey, Swampscott. From MICHIGAN: Frank N. Blanchard, George Wallace, Frank J. Hinds, Ann Arbor; D. L. Sargent, East Lansing; D. H. Janzen, Lansing. From MISSOURI: Louis M. Weber, St. Louis; A. F. Satterthwait, Elizabeth A. Satterthwait, J. M. Magner, Webster Groves. From NEW JERSEY: Norman McClintock, New Brunswick; Warren F. Eaton, Upper Montclair. From NEW YORK: George M. Sutton, Ithaca; E. E. Segerstorm, Johnstown; Mrs. C. N. Edge, F. L. Fitzpatrick, Cecelia Moore, Theodora Nelson, New York City; Jessie J. McCall, Potsdaw. From NORTH CAROLINA: A. Shaftsbury, Greensboro; Z. P. Metcalf, Raleigh. From OHIO: Pauline Belle Wyss, Bridgeport; Charles A. Dambach, Burton; H. B. McConnell, Cadiz; Mr. and Mrs. J. L. Floyd, Canton; Helen Dornette, Cincinnati; S. Prentiss Baldwin, S. Charles Kendeigh, Cleveland; Mr. and Mrs. E. L. Dakan, Mr. and Mrs. Robert B. Gordon, Mr. and Mrs. T. L. Langlois, Leonard B. Nice, Margaret M. Nice, Raymond C. Osborn, John Price, John H.

Schaffner, Columbus; R. D. Book, Corning; William Ireland, Jr., Grandview; A. W. Lindsey, Granville; E. L. Wickliffe, Grove City; Paul H. Stewart, Leetonia; William C. Baker, Salem; Lee Roach, Urichsville; C. T. Cutright, Wooster; J. L. Beeghly, Mr. and Mrs. Grant M. Cook, Youngstown; Mr. and Mrs. Lawrence E. Hicks, Zanesville. From PENNSYLVANIA outside of Pittsburgh: Robert W. Glenn, Avalon; Harry A. McGraw, Altoona; R. H. Reiber, Ben Avon; Dorothy Cleveland, Mrs. F. N. Cleveland, California; W. E. Dilley, Erie; Frank R. Smith, Fredericktown; Stanley J. Seiple, Greenville; Thomas S. George, Grove City; Dwight E. Sollberger, Ingram; Earnest Lakin, Johnstown; Maximilian Duman, Ann Gorski, Latrobe; Carl Auerswald, Dorothy Auerswald, Millvale; Edward C. Rainey, New Castle; C. H. Manley, New Kensington; Bayard H. Christy, Margaret M. Halworth, Martha A. Porter, Mrs. J. R. Rose, O. C. Reiter, Jennie B. Wallace, Frank A. Hegner, Sewickley; Anna May Arnold, Ernst Lachner, Keller Shelar, R. A. Waldron, Slippery Rock; Sidney D. Small, Edgewood; F. G. Hess, Mrs. K. G. Kutchts, Wilkinsburg; George J. Free, George L. Green, Oliver P. Medsger, State College; J. Warren Jacobs, Waynesburg; R. M. Corbett, West Sunbury; Sidney D. Small, Edgewood. From PITTSBURGH: Charles T. Agostini, E. W. Arthur, William L. Black, Helen Blair, Kate Blair, Mrs. A. C. Brandewyk, Margaret Brandewyk, J. A. Brown, John W. Brown, Helen Cashdollar, Edward L. Clark, Mary Lou Connell, Olive A. Corbett, H. S. Crass, Janette Dickson, H. D. Eastman, Fred Eberle, Agnes Fortman, Catherine Fricke, Reinhold L. Fricke, Laura Friel, Frank Glines, Dorothy Hartung, Alice Haworth, Ann Heese, Alva Held, Charles W. Hetzler, Frank Hinds, Marie B. Knaus, Robert Lehman, G. A. Link, Mr. and Mrs. A. C. Lloyd, M. Graham Netting, James M. Norris, J. J. Palmarin, Julius J. Palmisaro, Agnes Portman, O. C. Reiter, Robert L. Scott, H. L. Scribner, J. Sumpstein, Harold Thompson, George B. Thorp, W. E. Clyde Todd, Ruth Trimble, Millie R. Turner. From TENNESSEE: Albert F. Ganier, John T. McGill, Jesse M. Shaver, Nashville. From WASHINGTON, D. C.: Paul Bartsch, H. C. Bryant, Phoebe Knappen, Charles J. Spiker, John S. Wade. From WEST VIRGINIA: Harold Bergher, A. B. Brooks, Mr. and Mrs. Maurice Brooks ,Charles Conrad, Karl Haller, James Handlan, Mr. and Mrs. John W. Handlan, Thomas E. Shields, Clyde Upton, Russell West, Wheeling; D. Lee Shilliday, Barboursville; Chester M. Shaffer, Dorcas; Charles K. Llewellyn, Leonard Llewellyn, Robert C. Patterson, Keyser; J. L. Poland, Martinsburg.

SUMMARY OF ATTENDANCE: Canada, 1; Illinois, 7; Indiana, 2; Iowa, 1; Massachusetts, 2; Michigan, 5; Missouri, 4; New Jersey, 2; New York, 7; North Carolina, 2; Ohio, 32; Pennsylvania outside of Pittsburgh, 38; Pittsburgh, 49; Tennessee, 3; Washington, D. C., 5; West Virginia, 18. Total attendance, 178. Total outside of Pittsburgh, 129. Maximum number at each program session: Friday morning, 86; Friday afternoon, 103; Saturday morning, 96; Saturday afternoon, 87. Number at Annual Dinner, about 72. Number at Museum Open House, 82. Number of papers listed on program, 39.

REPORT OF THE TREASURER FOR 1934

From December 30, 1933 to December 15, 1934

Receipts for 1934

December 30, 1933, Balance on hand from last report			$ 697.88
The following was collected as dues from members:			
2 Associate members for 1932	$	3.00	
1 Active member for 1932		2.50	
8 Associate members for 1933		12.00	
2 Active members for 1933		5.00	
333 Associate members for 1934		499.50	
151 Active members for 1934		377.50	
33 Sustaining members for 1934		165.00	
8 Foreign members for 1934		15.50	
48 Associate members for 1935		72.00	
15 Active members for 1935		37.50	
13 Sustaining members for 1935		65.00	
6 Foreign members for 1935		9.03	
1 Associate member for 1936		1.50	
1 Sustaining member for 1936		5.00	
Total from membership dues			$1,270.03
The following was collected from subscribers:			
59 Subscribers for 1934	$	88.50	
1 Active subscriber for 1934		2.50	
13 Subscribers for 1925		19.50	
3 Fractional subscriptions or memberships		2.88	
Total from subscriptions			$ 113.38
The following were miscellaneous receipts:			
Collected for reprints	$	15.10	
Sale of back numbers of Bulletin		9.25	
Subsidies toward publication		16.50	
Contribution toward publication		100.00	
Miscellaneous receipts		8.35	
Total miscellaneous receipts			$ 149.20
Total receipts, including old balance			$2,230.49

DISBURSEMENTS FOR 1934

Printing four issues of BULLETIN	$1,037.12	
Cost of halftones, zincs, etc.	99.67	
Other expenses in Editor's office	68.53	
Cost of reprints	5.40	
Publication costs		$1,210.72
Expenses in Secretary's office	$ 112.44	
Expenses in Treasurer's office	47.61	
Subscriptions refunded account of error	7.05	
Exchange on Canadian checks	1.53	
Three checks returned (later made good)	8.00	
U. S. Tax on 41 checks at 2 cents each	.82	
General costs		$ 177.45
Total disbursements		$1,388.17
Balance on hand, December 15, 1934		842.32
Total		$2,230.49

(An itemized list of the disbursements with vouchers is attached for the Auditors).

Respectfully submitted,

W. M. ROSENE, *Treasurer.*

Ogden, Iowa, December 15, 1934.

ENDOWMENT FUND

December 30, 1933, Balance on hand from last report	$1,379.59
Interest second half of 1933, from City State Bank	17.70
Interest first half of 1934, from City State Bank	23.43
Interest last half of 1934, from City State Bank	21.30
December 15, 1934, Balance on hand	$1,442.02

This balance is deposited in the Savings Department of the City State Bank, of Ogden, Iowa, at 3 per cent interest, and is covered by the Federal Deposit Insurance. Nothing has been paid out of this fund during the year.

REPORT OF THE AUDITING COMMITTEE

The undersigned have examined the report of the Treasurer of the Wilson Ornithological Club for the fiscal year ending December 31, 1934, and vouchers accompanying the same, and have found them correct.

Respectfully submitted,

CHAS. J. SPIKER.
BAYARD H. CHRISTY.

Fig. 8. Group at the Annual W. O. C. Meeting, Pittsburgh, 1934.

REPORT OF THE LIBRARIAN FOR 1934

Ann Arbor, Michigan, January 16, 1935.

I have the honor to present herewith the fourth report of the Librarian of the Wilson Ornithological Club.

EXCHANGES. During the past year the library has received regularly on exchange *Iowa Bird Life* and the University of Iowa *Studies in Natural History*. The Librarian can not overemphasize the value of this material. The exchange of the BULLETIN for not only domestic but also foreign journals will be of inestimable scientific value to the Club and its library in the field of research. In this field the exchanges may quite naturally become the very backbone of the research library.

REPRINTING. On the matter of reprinting out-of-print numbers of the BULLETIN some progress has been made. With funds available from the sale of back numbers 100 copies of BULLETIN No. 10 (September, 1896) were made by the lithoprint process during the winter of 1934. This BULLETIN is available for $1.00 to non-members and for 80 cents to members of the Club, which is the same price that is charged for BULLETIN No. 9.

STOCK. During 1934 our stock was augmented only by the return from Dulau & Co., of London, of forty-two numbers of the BULLETIN (Vols. 37-39) for which the Librarian had to send $3 25 for carriage charges.

BOOK PLATE. As yet no book plate has been adopted by the Club although several have been submitted.

DONORS. The Librarian takes pleasure in acknowledging gifts to the Club Library from the following during 1934:

Mr. Samuel Harriot, New York, N. Y.
Mr. E. L. Sumner, Jr., Berkeley, Calif.
Mr. Warren J. Willis, New York, N. Y.

The gifts to the library for 1934 total 22 bound volumes and 242 separates, reprints, and unbound numbers of periodicals. This makes a total for the four-year period of the existence of the library of 178 bound volumes and 1387 separates.

Respectfully submitted,

F. P. ALLEN, *Librarian.*

KEY TO GROUP PHOTOGRAPH OF THE WILSON ORNITHOLOGICAL CLUB

1, William Ireland, Jr. 2, George B. Thorp. 3, Roy Black. 4, William C. Baker. 5, Paul H. Stewart. 6, Ruth Trimble. 7, Jesse M. Shaver. 8, T. C. Stephens. 9, Lawrence E. Hicks. 10, Margaret M. Nice. 11, Albert F. Ganier. 12, Ann Gorski. 13, Carl Auerswald. 14, Chas. J. Spiker. 15, Bayard H. Christy. 16, Charles A. Dambach. 17, Robert W. Glenn. 18, Dorthy Hartung. 19, Ann Heese. 20, Clyde Upton. 21, James Handlan. 22, Thos. E. Shields. 23, Mr. Bond. 24, Mrs. J. L. Floyd. 25, J. L. Floyd. 26, D. H. Janzen. 27, Warren F. Eaton. 28, Mr. Miller. 29, E. W. Arthur. 30, John W. Brown. 31, S. Prentiss Baldwin. 32, Louis M. Weber. 33, Elizabeth A. Satterthwait. 34, Edward S. Thomas. 35, Olive A. Corbett. 36, Agnes Fortman. 37,——. 38, Alva Held. 39, Laura Friel. 40, Alice Haworth. 41, Dwight E. Sollberger. 42, Martha Porter. 43, Mr. Ramey. 44, Leonard B. Nice. 45, E. L. Dakan. 46, Mrs. Lawrence E. Hicks. 47, Frank Glines. 48, J. L. Poland. 49, Frank R. Smith. 50, J. Warren Jacobs. 51, Mr. Rowe. 52, W. E. Clyde Todd. 53, J. Sumpstein. 54, Mrs. C. N. Edge. 55, George M. Sutton. 56, James Beeghly. 57, George Wallace. 58, Theodora Nelson. 59, Frank Hinds. 60, Mrs. Maurice Brooks. 61, Charles T. Agostini. 62, Norman McClintock. 63, John W. Handlan. 64, Mrs. John W. Handlan. 65, Catherine Fricke. 66, Reinhold L. Fricke. Copies of the 1934 W. O. C. group picture may be had for 50 cents each by writing to R. P. Hay, Industrial Photographer, Loeffler Building, Oakland, Pittsburgh, Pa.

COMMUNICATIONS

To the Editor:

I have just received and read through the December issue of the WILSON BULLETIN, and was particularly interested in the article by Mr. P. T. English, describing the observations on Red-tailed Hawks in the Williamston project. The article is very illuminating but it is difficult to believe that the conclusions on page 235 are unbiased.

In the author's introductory paragraph he states that the Red-tailed Hawk is not numerous. In fact, he was able to find only one pair to work on; and this pair raised only one young. Yet he has compared the results of one investigation with the data of other investigators, notably Warren and Fisher, whose work was undertaken on a far larger scale.

Furthermore, considering the game birds taken on this area, the author admits that the Hungarian Partridges released in that vicinity were wing-clipped birds and, therefore, handicapped in their chances to escape the hawks. It is, therefore, not reasonable to expect that any Red-tailed Hawk, in any area, would have the same feeding habits as this particular pair.

Moreover, assuming that one pair of nesting Red-tailed Hawks would take three and two-tenths per cent of the game on a 5000-acre area, is this justification for destroying one of our rapidly disappearing and most interesting of American birds? Game breeding for slaughter, especially of imported birds, is being carried too far. If killing of Red-tailed Hawks is recommended on all game-management projects it becomes difficult, if not illogical, to stop their being killed on every other place.

Conclusion No. 7, indicating that weasels might be beneficial rather than harmful, is unjustified from his investigation as he has not shown that the mice are in any way injurious to the game birds, or that the weasels are harmful. Why should not the conclusion be drawn that the weasels had been killing game and by the killing of the weasel save many of the game birds?

Furthermore, while the article in general is quite fair in stating both sides of the question, it hardly seems to justify the elaborate and apparently scientific-seeming conclusions which are based on inadequate study and that only one pair of nesting birds was considered, and that was in a game area.

It is my contention that even though a nesting Red-tailed Hawk takes a number of game birds, and if it is as rare a bird as Mr. English's investigations would leave us to believe, in the area considered, it would be better to overlook, for esthetic reasons, if for no other, the comparatively small damage done by the depredations. On page 234 he quotes Stoddard to the effect that unless red-tails are numerous they may as well be tolerated in game preserves, etc.

In my mind the important fact to consider is to what extent we are to allow private gain to reduce or destroy some of our wildest, most interesting, and esthetically desirable forms of bird life, such as the Red-tailed Hawk, irrespective of its economic status in any particular situation? The facts, while they may appear damaging from a game management point of view, are certainly none other than would be expected of a pair of hawks nesting in almost barn-yard conditions.

Very truly yours,

WARREN F. EATON,
In Charge National Association of Audubon Societies' Hawk and Owl Campaign.